

Clear "Wheet" or "Treet" Notes of Buff-throated Saltators really are hostile, this is a fact of some comparative interest. See also comments below.

Buff-throated Saltators utter 2 types of Hoarse Notes. They utter Hoarse Screamers which are apparently identical with those of Streaked Saltators. Captive individuals were heard to utter similar but shorter and (usually) much softer "whispered" notes during prolonged and violent disputes among themselves and with Streaked Saltators. These notes usually were uttered during contact fighting. Occasionally, they were uttered during brief "lulls" between fights (when the combatants were exhausted) and/or immediately after a fight. In such cases, they were usually or always accompanied by Gaping. In one case, they were also accompanied by Belly-fluffing and drooping of the wings (see below). They appeared to function as threat. They probably were purely hostile and very high intensity, produced when both attack and escape tendencies were very strong. The attack and escape tendencies may have been approximately equal to one another. Certainly, escape was not as predominant as in all or most "Wheet" Notes, but attack may have been less predominant than in the Harsh Hoarse Notes of many related species. Buff-throated Saltators do not utter Hoarse Notes (considering all the Hoarse patterns as a unit) as frequently as do Streaked Saltators, CBT's, or GBS's. They utter other calls and notes in many of the social situations in which the latter species utter one or more type of Hoarse Notes. In this respect, Buff-throated Saltators resemble Yellow-rumped Tanagers. It is possible, in fact, that the only two Hoarse Patterns of BTS's are strictly equivalent to the only two "pure" Hoarse patterns of Yellow-rumped Tanagers, produced by the same combinations of tendencies, of similar strength, and subserving the same function(s).

Wild Buff-throated Saltators were not heard to utter the softer type of Hoarse Note - probably because contact fights are relatively rare in

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under natural conditions. Where there is plenty of room in which to maneuver, an attacked bird usually retreats from its attacker, at least temporarily.

Both wild and captive Buff-throated Saltators utter sharp "Trit" or "Tit" Notes very frequently. Sometimes these notes are uttered by themselves alone, *i.e.* not in close association with other types of vocal patterns (see also below). Sometimes they are uttered singly or repeated at relatively long (and irregular) intervals. Several individuals were heard to utter such patterns in ambiguous but probably largely hostile circumstances. It is possible that single "Trit" or "Tit" Notes are ^{more or less closely related to} ~~largely or completely homologous~~ with the Short Hostile Notes of related species. They sound very much like the Short Hostile Notes of some populations of Silver-billed Tanagers (Ramphocelus carbo) and Black-throated Tanagers (R. nigrogularis).

The typical Rattles of Buff-throated Saltators are more or less prolonged series of short, hard notes uttered in more or less rapid succession, but they probably are shorter and slower in tempo, on the average, than the typical Rattles of Yellow-rumped Tanagers or Chlorospingus species. They usually begin abruptly. All or most of them could be transcribed as "Tuk tuk tuk tuk..." or "Tit tit tit tit...". Captive Buff-throated Saltators uttered Rattles most frequently during purely or predominantly hostile encounters, especially during chases. I think that the Rattles usually were uttered by the chasing birds rather than the birds being chased. In the wild, Rattles were heard to be uttered by individuals moving actively near other individuals who may have been either territorial rivals or potential mates. The individuals uttering Rattles in these circumstances sometimes performed overt hostile movements, and usually tended to advance toward their opponents or partners. Once, an individual uttered many Rattles (without any other calls or notes) while it performed many supplanting attacks. Once, another individual utt

Several times, wild birds were heard to utter unusually soft (3)
but otherwise typical R's when joining other individuals, possibly
their mates. These patterns were reminiscent of the "Muffled R"s of
some related species.

heard many Rattles and many "Warbles" (see below) while pursuing a (ques-
tionably) territorial rival. Once, one or both birds of an apparently mated pair
uttered a few ^{typical} Rattles when the two birds landed together. (This is certainly
not, however, the only "Greeting" pattern of the species — see below.) It seems
likely, therefore, that Rattles are at least partly hostile, and produced when the
tendency to attack is at least slightly stronger than the tendency to escape.

It is highly ^{probable} that the Rattles of Buff-throated Saltators are nothing
more than accelerated series of the "Tut" or "Tit" Notes sometimes uttered sin-
gly. Intermediate patterns occur occasionally. A bird may begin to utter single
"Tut" or "Tit" Notes at relatively long intervals, and then utter more notes of
the same type at progressively shorter intervals until the successive notes follow
one another as rapidly as in typical Rattles.

The most characteristic vocalizations of Buff-throated Saltators
may be called "Warbles." These are composed of Flowishes alone or (more fre-
quently) Flowishes and "Tut" or "Tit" Notes.

Flowishes are clear, rather musical, bisyllabic or trisyllabic notes
of moderate length and (usually) moderate loudness. Typical Flowishes could
be transcribed as "Tsee-yoo", "Tsa-wee", "Tasweeyoo", "Tsa-ha-weet", and "T-
sa-weet-weet". The different syllables of a single note are usually, or always,
quite different in pitch. The basic form or outline of these patterns seems to
be essentially identical with that of the Flowishes of Chlorospingus species and
Yellow-rumped Tanagers (and their motivation may be equally similar —
see below). When they are uttered apart from "Tut" or "Tit" Notes, they are
apparently always uttered in pairs or "doublets". Usually the two Flowish-
es of a single doublet are very similar to one another, having the same num-
ber of syllables and similar changes in pitch.

In Warbles which include "Tut" or "Tit" Notes, the Flowishes ma-

but the sequence of pitch changes is variable.

may be either single or double. In many Warbles, there is only one "Tut" or "Tit" Note. In others, there may be two to six, uttered one right after the other in a tempo which is moderately rapid but noticeably slower than that of typical Rattles. Single notes and series of this type are usually or always uttered immediately before the first (or only) Flowrich(es). In some series, all the notes are essentially similar or identical in pitch. In other series, one or more notes may be conspicuously higher or lower than the others. This variation is always irregular. Series are never consistently ascending or descending throughout. (It is, of course, the irregular variation of pitch, in conjunction with the moderately rapid rhythm that produces the actual warbling effect.)

Warbles are uttered by solitary or mated Buff-throated Saltators in exactly the same range of circumstances, during the breeding season, and during the same periods of the day, as the Day Songs of Striped Saltators. They probably also are true songs. A solitary bird uttering Warbles is usually joined by its mate or a potential mate. Warbles also are uttered in a variety of possibly or certainly hostile circumstances. They are common during disputes between territorial neighbors, and between individuals of the same sex in captivity. Sometimes they are combined with obviously hostile Bill-up Postures (see below). They may be uttered as a sort of "triumph ceremony" by the victor of a fight, after its opponent has fled. They may be uttered as "greetings" by mated birds when one joins the other or both land together. As far as I could tell, all types of Warbles are uttered in every one of these situations (although not necessarily with equal frequency). It seems likely that Flowriches are at least partly sexual, as they are similar to Dawn Calling Notes in sound (see below). The "Tut" or "Tit" Notes are almost certainly at least partly hostile (this is indicated by their relationship to Rattles).

Although Warbles sound quite different from the Day Songs of Str

The Rattle may even affect the Flowing part of a Warble. The ⑤
Flowing of one captive individual acquired a rattling undertone
when it uttered many Rattles and Warbles during a prolonged dispute

called Saltators, they are probably homologous with part of the latter. When
the two patterns are analyzed in detail, certain striking similarities in form are
apparent. The fluctuations of pitch in some Flowing is similar to that in the
Whistles of Panamanian Streaked Saltators. The grouping of Flowing in doublets
is paralleled by the double Whistles of the Streaked Saltator studied in chin
iqui. The "Tut" or "Tit" Notes occur before Flowing in the same way that
the "Duh" Notes occur before Whistles, and the rhythm of series of "Tut" or
"Tit" Notes is similar to that of series of "Duh" Notes.

The "songs" of Costa Rican Buff-throated Saltators which Shuteh
transcribes as "cheery cheery" and "cheer to you" may be Flowing like those
of Panamanian birds. Shuteh says that these patterns usually are sung re-
sponsively by mated birds. He apparently did not hear them during obvious
hostile encounters. It is possible, however, that some of the groups of two indi-
viduals which he took to be mated pairs were, in fact, territorial rivals or
opponents.

The Warbles of Panamanian Buff-throated Saltators frequently are as-
sociated with typical Rattles. Rattles may be uttered immediately before and
or after Warbles. The sequence of one Rattle followed by one Warble is by far the
most common. Many of the Warbles following immediately after Rattles seem
to be composed of Flowing alone, or of Flowing and only one "Tut" or
"Tit" Note (the single "Tut" or "Tit" being separated from both the prece-
ding Rattle and the following Flowing by very brief pauses). It seems possi-
ble that preceding Rattles tend to "absorb" the usual slower series of "Tut"
or "Tit" Notes. The Rattle-Flowing sequences seem to be essentially the same as
be essentially identical with the Rattle-Flowing songs of Brown-capped Bus-
h-tanagers. Similarly, the Warble-Rattle sequences seem to be completely ho-
mologous with the whole of the complete Day Songs of Streaked Saltators. Thus

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usually, Buff-throated Saltators utter one "Tut" or "Tit" note immediately before a Rattle-Flourish sequence. These performances may be largely or completely homologous with the "Tzzt" note - then Rattle - Hoarse Flourish patterns of Yellow-rumped Tanagers and/or the "Tut" - Rattle - Flourish patterns of Brown-capped Bush-tanagers. The whole Warble pattern, with or without Rattles, also is strikingly reminiscent of some warbling patterns of Atlapetes and other bush-finches.

Buff-throated Saltators seem to utter Rattle-Warble combinations in much the same range of circumstances as typical Rattles alone. There are some indications, however, that individuals uttering both Rattles and Warbles are somewhat less aggressive, on the average, than individuals uttering only Rattles. Combinations of Rattles and Warbles are among the more common "Fighting" patterns.

The Warbles and Rattle-Warble sequences of individuals not actively engaged in chases or actual fights are combined with Bill-up Postures or, more frequently, unritualized upright sitting postures similar to the postures accompanying Dawn Calling (see figures —).

Dawn Calling is probably the least distinctive vocal pattern of the species. It usually is uttered in the same range of circumstances as the Dawn Calling of Striped Saltators and many other finches and tanagers. The individual Dawn Calling Notes are very similar to those of Striped Saltators in tone. Some of them may also be identical in form; but most of them are longer and include more syllables, up to four or five in many cases. Buff-throated Saltators are particularly apt to utter two slightly different types of notes, one having one more syllable than the other, in very regular alternation. Typical Dawn Calling series might be transcribed as "Whee-ew whee-ee-ew whee-ew whee-ee-ew..." and "Tee-a-a-weeyoo tee-a-a-weeyoo tee-a-a-weeyoo tee-a-a-weeyoo..."

(Shuteh notes classifies the Dawn Calling of Costa Rican Buff-throated Saltators as "trale' le-e-le, trale' le-e-le...".) All Dawn Calling notes of this type, by themselves alone, sound very much like Flourishes. The Dawn Calling of one captive individual included a few single, loud, harsh "cheewink" notes (all or most of which had rattling undertones), interspersed at irregular intervals among softer five-syllabled notes of the usual type. These "cheewink" notes probably are related to the Rattles and semi-rattling notes in some Dawn Calling performances of streaked Saltators and Crimson-bellied Tanagers. The Dawn Calling of Buff-throated Saltators usually is not accompanied by special movements. But one captive bird (not the individual that uttered "cheewink"s) was observed to perform slight wing movements during one burst of Dawn Calling. It flexed its wings upward, a fraction of an inch, each time it uttered a note, and lowered them again (to the usual resting position) between notes. I think that the wings also were quivered very briefly, slightly, and rapidly while they were raised. This was reminiscent of the more exaggerated "Upward Wing-quivering" which accompanies the Dawn Calling of Brown-capped Bush-tanagers (and at least one species of Atlapetes).

The hostile repertoire of Buff-throated Saltators includes both special movements and ritualized postures, in addition to the calls and notes cited above. Among these ^{non-vocal patterns} are Gaping, "Crest-raising", Bowing (and Pivoting), Head-lowered Postures, Bill-up Postures, Lateral Fluffing, and Belly-ruffling. Bill-up Postures were observed to be performed by both captive and wild individuals. All the other patterns were seen only during disputes among captive individuals. Crest-raising may have been overlooked in the wild because it is inconspicuous. The remaining patterns probably are produced only when motivational conflict is very strong. They were observed only during prolonged disputes between individuals in close proximity to one another. They may be perfor-

med relatively rarely in the wild simply because prolonged "close-range" disputes are rare under natural conditions (see above).

The Gaping seems to be basically similar to that of Striped Saltator in form. It is almost confined to actual fights. It may be silent or (less frequently) accompanied by Hoarse Notes. It usually is not combined with other display components (except ordinary locomotor patterns); but once a bird was seen to perform brief Gaping while sitting in a rather hunched posture with Crest-raising and Belly-ruffling at the end of a particularly prolonged dispute (see below). The Gaping of Buff-throated Saltators may be slightly less aggressive than the corresponding pattern of many related species. It often is performed by individuals which appear to be slightly on the defensive. It seems to function as threat.

Crest-raising is a simple erection of all the feathers of the crown (see figure —). It is inconspicuous because the crown feathers are not lengthened. It is most frequently performed by itself alone, without any other display. I have seen individuals perform simple Crest-raising of this type as a reaction to the mere approach of other individuals. Occasionally, Crest-raising is accompanied by Belly-ruffling, Gaping, Bowing, Warbles and/or Rattles. Very rarely, there may be a slight trace of Crest-raising (partial erection of the crown feathers) superimposed upon Head-lowered or Bill-up Postures. It is possible that the Crest-raising of Buff-throated Saltators is primarily an expression of escape motivation, like the morphologically similar patterns of many related species.

The Head-lowered Posture is not very exaggerated in form, and may be only slightly ritualized. The head is brought down to shoulder level, while the bill points straight forward. This is usually, but not always, accompanied by Lateral Fluffing (see figure —). Head-lowered Postures may

be combined with pivoting, and may be used as the "low posture" during Bowing (see below). They obviously are aggressive. They are assumed most frequently by attacking birds immediately before attack.

In Lateral Fluffing, all the feathers of the flanks and sides are raised. This greatly increases the lateral dimensions of the bird performing the pattern. Such a bird looks very broad when viewed from the front or rear. In all or most Lateral Fluffing, the feathers also are erected in such a way as to form two "tufts" or "peaks" on each side, rising diagonally upward to cover the lower edges of the wings. The anterior tufts may be large and conspicuous enough to look like "false wings." (This is difficult to describe in words, but it is illustrated in figure —.) Lateral Fluffing is almost an integral part of the Head-lowered pattern. The only other postures with which it may be associated are some unusual Bill-up patterns which probably are partly intermediate between typical Bill-up Postures and typical Head-lowered Postures.

In typical Bill-up Postures, the head and bill are pointed almost vertically upward, while the body and tail remain in a diagonal position or approximately horizontal (see figure —). Most Bill-up Postures are accompanied by some degree of Belly-ruffling. The wings are usually drooped, but not spread, except when Lateral Fluffing is also present. Bill-up Postures are usually silent. They often serve as "high postures" during Bowing, and may be combined with pivoting. Occasionally, they are accompanied by Warbles, Rattles, and/or "Wheet" Notes. They obviously are less aggressive than Head-lowered Postures. They are performed immediately before escape as well as attack.

Bowing is a more or less rapid alternation of up and down movements. A Bowing bird alternately stands with its head held high and with its head held low. Performances of this type are stereotyped enough to suggest that they have become slightly ritualized, but they are variable in some aspects of for

m. Sometimes the high postures are Bill-ups. Sometimes they are nothing more than ordinary "alert-looking" upright postures. Sometimes the low postures are extreme Head-lowered Postures. More often they are less exaggerated. In many cases, the downward component of Bowing is nothing more than a brief downward "flick" of the head and neck. The time spent in low and high phases is different in different Bowing performances, and may even vary within a single performance, presumably in accordance with the (relative) level of aggressiveness in the performing birds.

Pivoting is composed of lateral movements. A pivoting bird looks from side, usually swinging the whole head, neck, and body together. This is much more irregular in form than Bowing, and probably is not ritualized per se. It may be combined with, or alternated with, or performed quite apart from Bowing. It obviously is the result of conflicting tendencies to advance and retreat. Both Bowing and pivoting usually are accompanied by Wing-fluttering and Tail-flicking movements and extreme Tail-fanning.

The Bill-up Postures, Bowing, and pivoting of Buff-throated Saltators are very reminiscent of Atlapetes and other bush-fundlers, many of which perform similar (or even more exaggerated) patterns in similar circumstances.

The Belly-ruffling of Buff-throated Saltators is a raising of all the feathers of the lower breast and belly. They usually or always are raised in such a way that their tips are conspicuously separated from one another. A moderate degree of Belly-ruffling usually accompanies Bill-up Postures (see figure —). The most extreme Belly-ruffling observed was performed by an exhausted and defensive individual which had been chased and attacked, repeatedly, by another individual over a period of a half hour or more. This was combined with Alert-raising, Lateral Fluffing, and (briefly) Gaping (see figure —). The whole combination of patterns was very reminiscent of the "Hu

of "Hunched" patterns of many related species.

Buff-throated Saltators were not observed to perform copulatory patterns. Perhaps they tend to copulate in denser vegetation than do Streaked Saltators.

THE GRAY SALTATOR (S. coenulescens)

A few Gray Saltators were observed in the countryside near Iquitos, Peru, between December 14 and December 24, 1958. They were found along the edge of second growth forest and scrub, and did not seem to be more gregarious than other species of the genus. According to Hellmayr (op. cit.), the Gray Saltators of this region belong to the subspecies agatae.

Some individuals (known or presumed males) uttered loud phrases which appeared to be Day Songs whenever they found themselves alone. These phrases were composed of "Duh" Notes and Whistles which sounded very much like the corresponding patterns of Streaked Saltators. The form of the phrases was somewhat variable. One individual, for instance, uttered some phrases which consisted of four or five "Duh" Notes followed by one long Whistle, and other phrases of one "Duh" Note followed by two long Whistles followed by two more "Duh" Notes followed by one more, rather short, Whistle. Short Day Songs were uttered from the rather exaggerated, but not necessarily ritualized, upright posture illustrated in figure —.

Some of the same individuals also uttered much softer phrases composed of a few "Duh" Notes followed by one Rattle. One individual (at least) uttered these soft phrases when it was "semi-isolated", i.e. when there was another individual (possibly its mate) in the neighborhood but not close by.

Several individuals were heard to utter metallic (and possibly slightly nasal) "Tut" Notes.

Perhaps the most interesting vocal patterns were Hoarse Notes. They usually were uttered in series (sometimes very long series) which might be transcribed as "Kanh kanh kanh kanh...". They were uttered most frequently as "greeting" patterns, whenever one bird landed beside another (presumably its mate, in all the cases I observed). These performances were very reminiscent of the series of The Linn Hoarse Notes and "Chah" Notes uttered by Green-backed Sparrows and Striped Saltators in similar circumstances. Unlike the latter species, however, the Gray Saltator also uttered many Hoarse Notes during "Duets" between mated birds quite apart from "Greetings" or landing. It was not uncommon to hear an individual utter a series of Hoarse Notes while it was sitting beside its mate, after the two birds had been close together, continuously, for some minutes. In most cases, the mate responded by uttering a similar series of Hoarse Notes. Usually the responding bird began its Hoarse Notes only a few seconds after the first, and the series of the two birds overlapped very broadly. Sometimes one member of a pair would utter a few "Tut" Notes and/or Day Song notes in addition to (perhaps even instead of) Hoarse Notes during a Duet. Sometimes the members of a pair would Duet repeatedly at very short intervals. In most cases, it was impossible to identify the stimulus receiving Duetting. Duetting birds usually did not perform overt hostile movements. In one peculiar case, a known male repeatedly began to utter Day Songs while sitting close to a presumed female. Each time it did this, its partner responded by uttering a series of Hoarse Notes. As soon as this began, the male stopped its Day Song phrase and began to utter Hoarse Notes too. The Hoarse Notes obviously are very contagious.

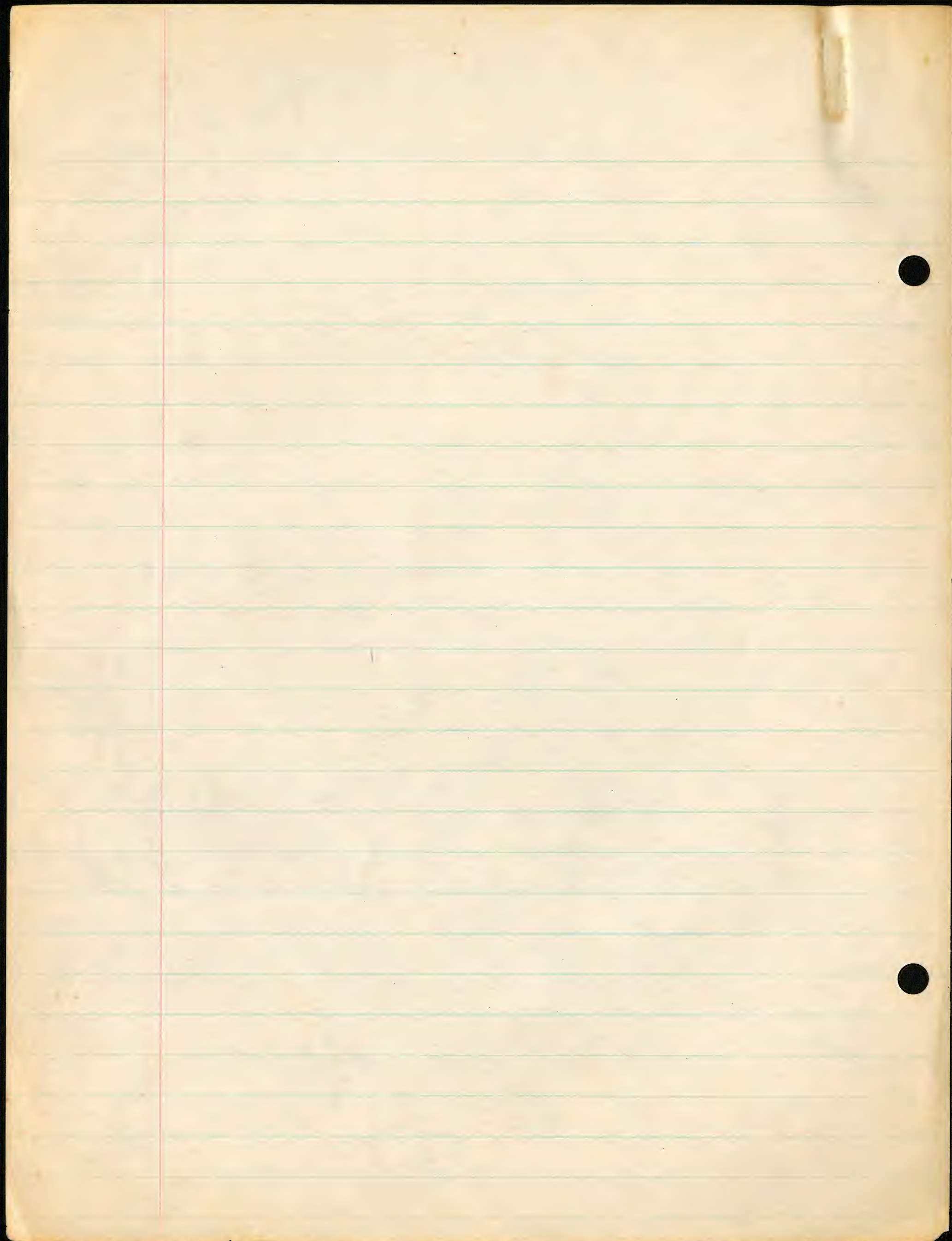
If the Duetting of GS is very reminiscent of BHS (see below).

→ One apparently successful copulation attempt was observed. The female performed elaborate displays beforehand, while the male was several yards away from her. First she uttered a few single notes that were both metallic and strongly nasal. These might be transcribed by something like "Auh". Then she asso-

used a Bill-up Tail-up Posture, ruffled her belly feathers, and performed Wing-quivering with her wings held out and slightly drooped (see figure —). At the same time she uttered several Hoarse Notes, (probably) followed by one or two Rattle. After the copulation, one or both birds uttered more Hoarse Notes.

THE BLACK-HEADED SALTATOR (S. atriceps)

Black-headed Saltators were studied in most of the same areas of central Panama, during the same period of time, as Buff-throated Saltators.



The Evolution of Song and Song-like Patterns in Some New World Parrots

I Neotropical finches, tanagers, honeycreepers. Recent classification into families, sub-families, tribes, etc., not necessarily correct, but no doubt that all these groups closely related to one another.

II Several vocal patterns present in some or all species of every group:

(a). Indefinite repetition of essentially similar notes. Throughout the day in some groups. Probably the primitive condition. Confined to early morning in other groups. "Dawn Calling". In song.

(b). Clear plaintive essentially single notes. Frustrated or angry.

(c). Hoarse, harsh, rattling notes. Hostile.

(d). Juvenile "sub-song".

III. Definition of song.

Thorpe's.

Muir.

IV Evolution song-like patterns.

(a) Indefinite repetition single notes lost in some species, confined to early morning in others — but otherwise very common in form. Why? Worthwhile to attract females other species? Dangerous to alter form successful display.

(b). No "real" song some species. HN's and PN's repeated etc.

(c) One or more "real" songs other species HN's and

PN's linked

(d) It is only in these species that DC has disappeared (?)

(e) In some cases WS has taken over song functions and place. Why?

(f) One of the advantages of sub-song is that it provides a "reservoir" of more or less "undifferentiated" sounds which can be drawn upon in case of need.



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DISPLAY PATTERNS OF TROPICAL AMERICAN "NINE-PRIMARIED" SONGBIRDS

V. Saltator

M. Moynihan

This is the fifth in a series of papers on the ritualized, social signal, behavior patterns of some tropical American finches, tanagers, and honeycreepers. The preceding papers of the series were concerned with the genera Chlorospingus, Ramphocelus, and Arremonops (Moynihan, 1962b, 1962c, 1963, and 1965). The following account will include brief descriptions of some patterns of five species of Saltator, large "grosbeak" type finches. These species were not studied in detail, but enough of their behavior was seen to permit a partial evaluation of the comparative position of the genus.

THE STREAKED SALTATOR (S. albicollis)

Wild individuals of this species were observed in the Canal Zone and adjacent parts of the Republic of Panama at irregular intervals between March, 1958, and April, 1962. In addition, a few individuals were trapped in some of the same areas, and kept and studied in large aviaries on Barro Colorado Island. According to Hellmayr (1938), all these birds should have been representatives of the subspecies isthmicus.

Like all the other species of the genus with which I am familiar, Streaked Saltators seem to prefer "edge" habitats, especially the edges of second-growth vegetation, scrub and small trees. They seldom go very far inside dense scrub, and ~~usually range from three to twenty-five feet above the ground, seldom or never coming down to the ground itself.~~ usually range from three to twenty-five feet above the ground, seldom or never coming down to the ground itself. Some aspects of their general social behavior in Panama are described in Moynihan (1962a). They are not very gregarious. They ~~usually associate in~~ MAY OCCUR SINGLY OR IN

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(IN THE BREEDING SEASON) IN
pairs or small family groups of parents with one brood of {one or two} young.
~~in the breeding season. In the non-breeding season, individuals are usually alone.~~
They usually do not associate with mixed flocks or individuals of other species
during either the breeding or non-breeding seasons.

The account in Skutch (1954) would suggest that the general social habits and
habitat preferences of Streaked Saltators in Costa Rica and Colombia are much the
same as in Panama.

There is nothing very distinctive about the locomotory movements or intention
movements of Streaked Saltators or any other species of the genus with which I am
familiar. They all perform ritualized Wing-flicking and Tail-flicking movements
which are not significantly different, in form, from those of Ramphocelus species
or the Green-backed Sparrow (Arremonops conirostris). As in the latter species,
Tail-flicking is often accompanied by fanning of the tail feathers.

The unritualized and slightly ritualized hostile movements and postures
of Streaked Saltators seem to be equally undistinguished in form, but comparatively
very rare, under natural conditions. Single individuals and mated pairs ~~of this~~
~~species~~ apparently maintain territories or exclusive home ranges. The same individ-
uals are found in the same areas for (at least) months on end. But I never saw an
actual fight, or even close contact, between presumably territorial neighbors in
the wild. The most vigorous hostile reactions observed were performed by a captive
individual during disputes with a Buff-throated Saltator. Its hostility took the
form of Gaping (sometimes silent, sometimes accompanied by Hoarse Notes — see
below) and "head forward threat" postures (sometimes with Gaping, more often without).

Most of the displays of Streaked Saltators are vocal. Among them are "Tsit"
Notes, a variety of Hoarse Notes, Day Songs (including "Duh" Notes, Whistles, and
Rattles), and Dawn Calling.

"Tsit" Notes are sharp, thin, and not very loud. They may be uttered singly
or in irregular series. They are uttered in a variety of circumstances, when

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several individuals are more or less close together. Sometimes they are accompanied by escape movements or intention movements. They may be "contact" or "call" notes or (alternatively) alarm notes. (These "Tsit" Notes may be the same as the "tseek" notes which Eisenmann, 1954, heard uttered by wild Streaked Saltators on Barro Colorado Island.)

The Hoarse Notes can be divided into three main types. An individual caught in a trap (or held in the hand) utters long, loud, urgent-sounding "Hoarse Screams," quite like those of many related species. These probably are purely hostile and high intensity, i.e. produced by very strong motivation. Similar but softer notes were uttered by the captive individual disputing with a Buff-throated Saltator. They were closely associated with overt attack movements, and presumably were aggressive and of moderate intensity. They appeared to be essentially identical with the "Harsh Hoarse Notes" of Green-backed Sparrows and Crimson-backed Tanagers (Ramphocelus dimidiatus). Both these types of Hoarse Notes seem to be much less common than the third type, which may (for want of a better name) be called "Chah" Notes. "Chah" Notes are usually or always uttered in short series. In many series, the successive notes become progressively shorter and lower in pitch; but all the notes of some series are slightly longer than the corresponding notes of other series. The longest "Chah" Notes may be slightly bisyllabic and could be transcribed as "Cha-ah". The shortest notes end very abruptly and might be transcribed as "Chak" (some are almost "Chuk"). Intermediates between the longest and shortest notes are common, i.e. the two extremes seem to intergrade completely. "Chah" Notes of all types are uttered most frequently when one individual joins another (its mate or another member of its own family group), and when two or more individuals are moving about in more or less close proximity to one another. Occasionally, they are uttered by apparently single individuals landing alone. Thus, they appear to be "greeting" or "landing" patterns like the "Medium Hoarse Notes" of Green-backed Sparrows. The longer "Chah" Notes also

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sound very much like Medium Hoarse Notes. This would suggest that the two patterns are, in fact, closely related, perhaps even strictly homologous. The shorter "Chah" Notes sound somewhat intermediate between the other Hoarse Notes and the "Short Hostile Notes" of Green-backed Sparrows and some other finches and tanagers. They may be related to both. (This is not really surprising. Even in the case of the Green-backed Sparrow, and in other species such as the Yellow-rumped Tanager, Ramphocelus flammigerus icteronotus, there are indications that Hoarse Notes and Short Hostile Notes are ~~related or~~ linked to one another in some way.) It is possible that all the "Chah" Notes of Streaked Saltators, although occurring in ambivalent situations, are purely hostile (as the Medium Hoarse Notes of Green-backed Sparrows seem to be). The longer "Chah" Notes are not very different in sound from the Harsh Hoarse Notes. They may be more aggressive than the shorter "Chah" Notes. (The Short Hostile Notes of other species seem to be produced when the escape tendencies are at least slightly stronger than the attack tendencies.) All or most of the "Chah" Notes may be lower intensity, produced by weaker motivation, ^{ON THE AVERAGE} than the Harsh Hoarse Notes.

Skutch (op. cit.) mentions "qua qua qua..." notes uttered by Costa Rican Streaked Saltators in flight. These may be the same as, or closely related to, the notes called "Chah" above.

During the breeding season, isolated and apparently single birds, presumably unmated males or males separated from their mates*, perform Dawn Calling early in the morning. As in related species, the Dawn Calling takes the form of series of notes uttered at regular intervals. The length of the series is indeterminate, ranging from very brief to very long (I heard one bird utter Dawn Calling notes almost without interruption for over an hour). Most of the notes in the Dawn Calling of Streaked Saltators are clear in tone (but not whistling) and could be

*It is usually impossible to distinguish between male and female saltators (of any species) by appearance alone in the field.

transcribed as "Kew" or "Kioo". They sound very much like the most common notes in the Dawn Calling of Crimson-backed Tanagers (which are abundant in many of the same areas as Streaked Saltators). It is, in fact, sometimes impossible to tell which species is uttering the notes when the performing individual is not in sight. Most of the "Kew" or "Kioo" Notes uttered by Streaked Saltators are very uniform in pitch. Sometimes, however, single notes which are very much higher in pitch but otherwise similar to ordinary "Kew"s are interjected in the series at irregular intervals. All or most Dawn Calling performances also include single brief Rattles, or "Kew" Notes with a pronounced rattling "undertone", as well as the clear notes. These rattling notes may be uttered in regular alternation with typical "Kew" or "Kioo" Notes, or interjected less frequently and apparently at random. These performances are reminiscent of the Dawn Calling performances of Crimson-backed Tanagers in which single guttural or semi-rattling "Kraa" or "Kraanh" Notes are interjected among typical "Kew"s. It seems very likely that the Dawn Calling of Streaked Saltators, or at least their "Kew" or "Kioo" Notes, are also similar to the corresponding patterns of related species in being produced by (thwarted) sexual motivation and functioning as a signal to attract or summon mates or potential mates.

The dawn "song" of Streaked Saltators in Costa Rica which Skutch transcribes as "chip rrr chup chup chip rrr..." is probably Dawn Calling like that of the Panamanian birds.

Eisenmann transcribes what seems to be Dawn Calling by Streaked Saltators on Barro Colorado Island as "chee-oo, chee-oo, chee-oo, cheeeee-oo" etc.

The most characteristic vocalizations of Streaked Saltators in central Panama are Day Songs. These are series of extremely varied notes. The series are always brief, i.e. more or less determinate in length. A typical "complete" Day Song begins with two or three short and rather "colorless" notes, each of which might be transcribed by something like "Duh". When three of these notes are uttered, the interval between the first and second notes usually is longer than the interval between the second and third notes. The first note often is

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slightly higher in pitch than the second (and third). These introductory notes are followed by a long, clear, loud, and rather melodious Whistle. A typical Whistle might be transcribed as "Wheeeeeeeeeoooo". It usually begins at a high pitch and then descends steadily, or begins moderately high, ascends briefly, and then descends. The Whistle is followed by a Rattle, usually or always longer than the Rattles during Dawn Calling. This ends the performance.

The whole series of notes can be represented in diagrammatic form as follows:

Performances of this type apparently are uttered only by single or isolated birds, unmated or separated from their mates, during the breeding season. They [<]probably are "true" songs, as the term is used in this series of papers. They probably attract individuals of the opposite sex and repel other individuals of the same sex. I was not able to prove this conclusively (because there were no overt reactions between neighbors or rivals); but the evidence, such as it is, is highly suggestive. Certainly, a bird uttering these patterns is usually joined by its mate (or a potential mate) sooner or later, ~~and then the performance is repeated~~. And the form of the various notes would suggest that the motivation of the performance as a whole is ambivalent in the way that would be expected of true song. Rattles appear to be purely or predominantly hostile in all related species in which it has been possible to analyze their motivation. The "Duh" Notes seem to be related to hostile patterns of Buff-throated Saltators (see below). The Whistles, on the other hand, may be largely or completely sexual. Almost all the patterns of related species which are equally clear in tone, without any hoarseness or harshness or any trace of rattling, are known to be produced by sexual and/or other "friendly" tendencies.

Streaked Saltators tend to utter these patterns most frequently during the middle part of the morning, after Dawn Calling has ceased, and may continue

them throughout the day. The temporal distribution of these patterns is very reminiscent of the "Rattle - Flourish Day Songs" of Brown-capped Bush-tanagers (Chlorospingus ophthalmicus).

Some of the probable relationships between the individual components of Streaked Saltator Day Songs and vocalizations of other finches and tanagers will be discussed in more detail below, after the corresponding patterns of other saltators have been described.

The Day Songs of Streaked Saltators in central Panama are quite stereotyped in form. Only two variations are common. Sometimes the terminal Rattle is omitted. Sometimes an extra, fourth, introductory "Duh" Note is inserted before the Whistle.

There may be considerable differences between the Songs of Streaked Saltators in different regions. All the Song phrases of one individual studied near Cerro Punta on the Volcan de Chiriqui in western Panama were composed of introductory notes like those of the birds in central Panama, followed by one long Whistle, followed by one short Whistle, followed by another "Duh" Note. The Whistles themselves had a faint rattling undertone, but there were no pure Rattles. The only pattern of Costa Rican Streaked Saltators described by Skutch which might be closely related to part of the Songs of the Panama birds is "a refrain of four or five whistled syllables, forming an exquisitely modulated crescendo, and with the last syllable the longest".

All Panamanian Streaked Saltators utter their Day Songs from largely or completely unritualized erect sitting postures (see figures 1a and 1b).

The major ^{TYPES OF} vocal patterns (or groups of patterns) of Panamanian Streaked Saltators are quite "discrete". They do not intergrade with one another to any appreciable request. In this respect, Streaked Saltators resemble most other finches and tanagers and are very different from Yellow-rumped Tanagers.

Three copulation attempts by Streaked Saltators were observed in central Panama. Two of these began when the male flew straight on to the back of the

female, uttering "Chah" Notes in flight. One of these copulation attempts was apparently successful, the other obviously unsuccessful. In neither case was there any other display by either bird before, during, or immediately after the attempt. The third attempt was a little more elaborate. A female landed in a tree, uttering "Chah" Notes as she did so. Then she ~~shook up~~^{FELL SILENT}, but assumed a Bill-up Tail-up Posture, with her breast lowered and all the plumage of the lower breast and belly fluffed or ruffled. At the same time, she stretched her wings out horizontally, but apparently did not quiver them. Then a male, who had been perched quietly in a tree about twenty feet away, flew straight on to her back and began copulatory movements immediately. The copulation was apparently successful. There was no post-copulatory display, but the two birds eventually flew off together uttering "Chah" Notes.

THE BUFF-THROATED SALTATOR (S. maximus)

Wild individuals of this species were studied in the same areas of central Panama as Streaked Saltators between March, 1958, and April, 1962; and captive individuals also were kept in aviaries on Barro Colorado Island. According to Hellmayr (op. cit.), these birds should have been examples of the subspecies intermedius.

Buff-throated Saltators are larger than Streaked Saltators but somewhat more slender in build. They often occur along the edges of scrub and second-growth forest which is somewhat taller (and presumably older) on the average than the scrub preferred by Streaked Saltators; but the territories or home ranges of individuals of the two species may be broadly or completely overlapping in many areas. Individuals of both species sometimes occur in the same trees. They may even sit or feed in the same branches — but apparently never simultaneously. I have never seen (or heard) any overt, positive, reaction between individuals of the two species (but this does not necessarily mean that the

behavior of either one or both species is not influenced by the presence or proximity of the other).

The general social behavior of Panamanian Buff-throated Saltators is strikingly different from that of Panamanian Streaked Saltators in one important respect. The Buff-throated Saltators of this region are not openly very gregarious among themselves. Individuals of different pairs or family groups do not usually join or follow one another in a "friendly" manner, or associate with one another in flocks. But territorial neighbors do approach one another with some appreciable frequency. (This must be an "intrinsic" difference between the two species, as populations of the two species seem to be approximately equally dense in many areas of central Panama.) As far as I could tell, all or most of the encounters between neighboring Buff-throated Saltators are largely or completely hostile. Panamanian Buff-throated Saltators certainly perform many more overtly hostile behavior patterns than Streaked Saltators in the same areas. They seem to be particularly likely to perform many conspicuously aggressive ^{PATTERNS} ~~movements~~, such as supplanting attacks and chases.

The account of Costa Rican Buff-throated Saltators in Skutch (op. cit.) would suggest that their general social behavior is at least very similar to that of the Panamanian birds. But Skutch also says that Carriker and others found Buff-throated Saltators in small flocks in some parts of Central America. It is possible, therefore, that gregarious tendencies are among the factors that cause Panamanian Buff-throated Saltators to approach one another, even when the approaches are not obviously friendly.

Panamanian Buff-throated Saltators may be associated with individuals of other species, of other genera, somewhat more frequently than are Streaked Saltators (Moynihan, 1962a); but this may be largely due to the fact that other species, especially those species which form mixed flocks among themselves, are more common in the trees preferred by Buff-throated Saltators than in the lower vegetation preferred by Streaked Saltators.

THE VOCAL REPERTORY

INCLUDES

~~The displays~~ of Panamanian Buff-throated Saltators ~~include hopping~~ "Wheet" Notes, Hoarse Notes, "Tsit" Notes, Rattles, Flourishes, Dawn Calling, ~~various puffing and fluffing patterns, Bill-up Postures and (probably) several other special postures and movements.~~

~~The Gaping seems to be basically similar to that of Streaked Saltators in form. It may be silent or (occasionally) accompanied by Hoarse Notes. It was observed only during disputes among captive individuals, usually prolonged and vigorous disputes.~~

The "Wheet" Notes (all or most of which might be equally well transcribed as "Tseet") are clear, fairly high pitched notes of moderate length. They may be uttered singly or in series, sometimes short, occasionally long. They are uttered in a great variety of more or less ambiguous situations. I have heard such notes uttered by apparently single birds in the wild, by one or both birds of pairs in the wild, and by captive birds in close association with both overtly hostile and overtly sexual patterns. They are uttered much more frequently by birds in flight, or hopping rapidly from perch to perch, than by birds sitting still. Thus, they could be purely locomotory "flight calls" and/or hostile signals and/or sexual signals. It may be significant, however, that the longest and most rapid series of such notes heard during the present study were uttered by captive individuals escaping from more aggressive individuals during particularly violent disputes. This would suggest that many, perhaps all, "Wheet" Notes are purely or predominantly hostile, and produced when the tendency to escape is stronger than the tendency to attack. They may be related to the "Tsit" Notes of Streaked Saltators, and subserve the same or similar functions. (In many, perhaps most, other tanagers and ^{NEW WORLD} finches, vocalizations which include clear "ee" sounds are purely or predominantly sexual. The only known exceptions, among ^{SOME SPECIES OF} the neotropical forms with which I am familiar, are Chlorospingus ~~species~~ and ~~some species of "bush-finches"~~ Atlapietes, and related genera. If the

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— from Mar 5, 1962

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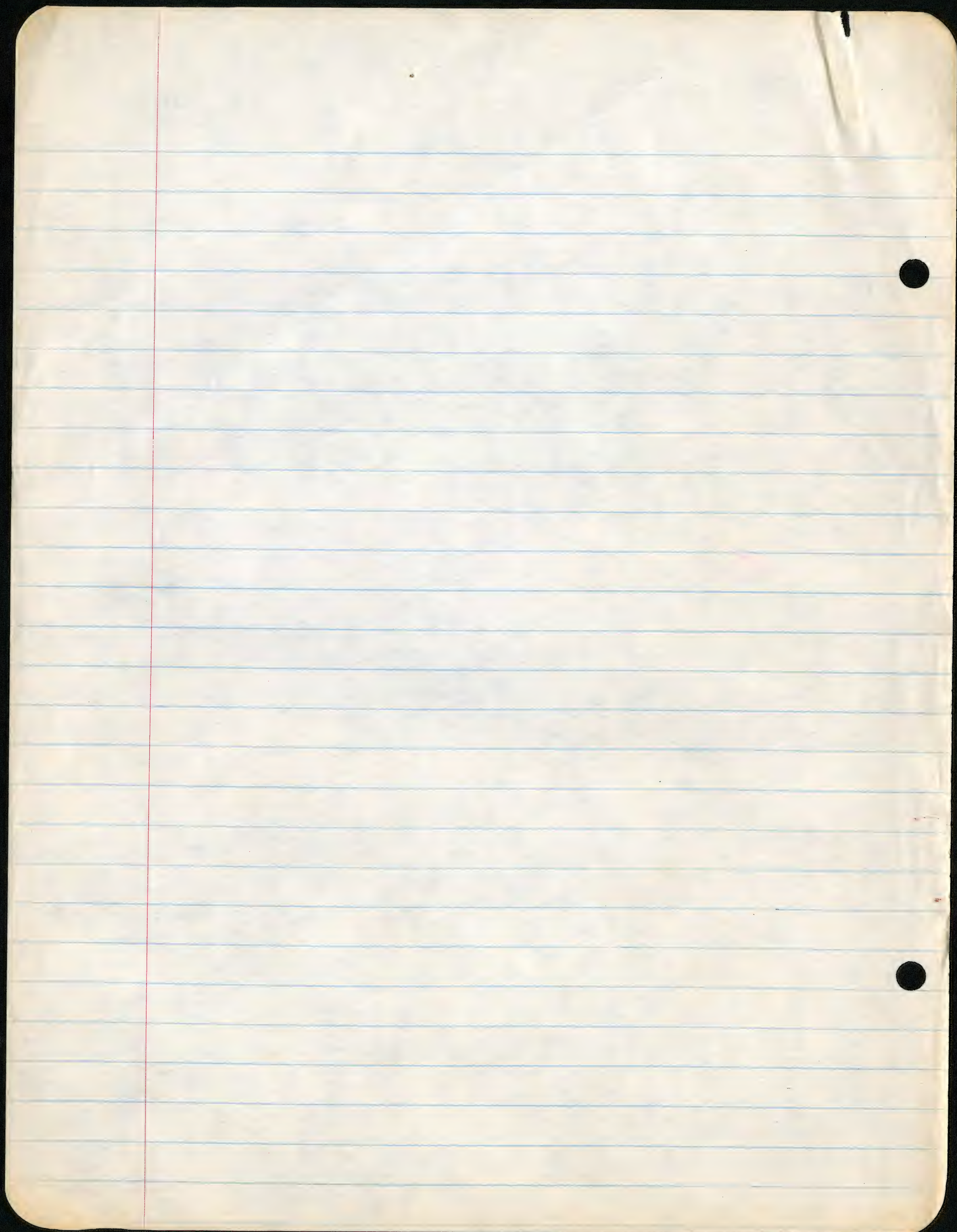
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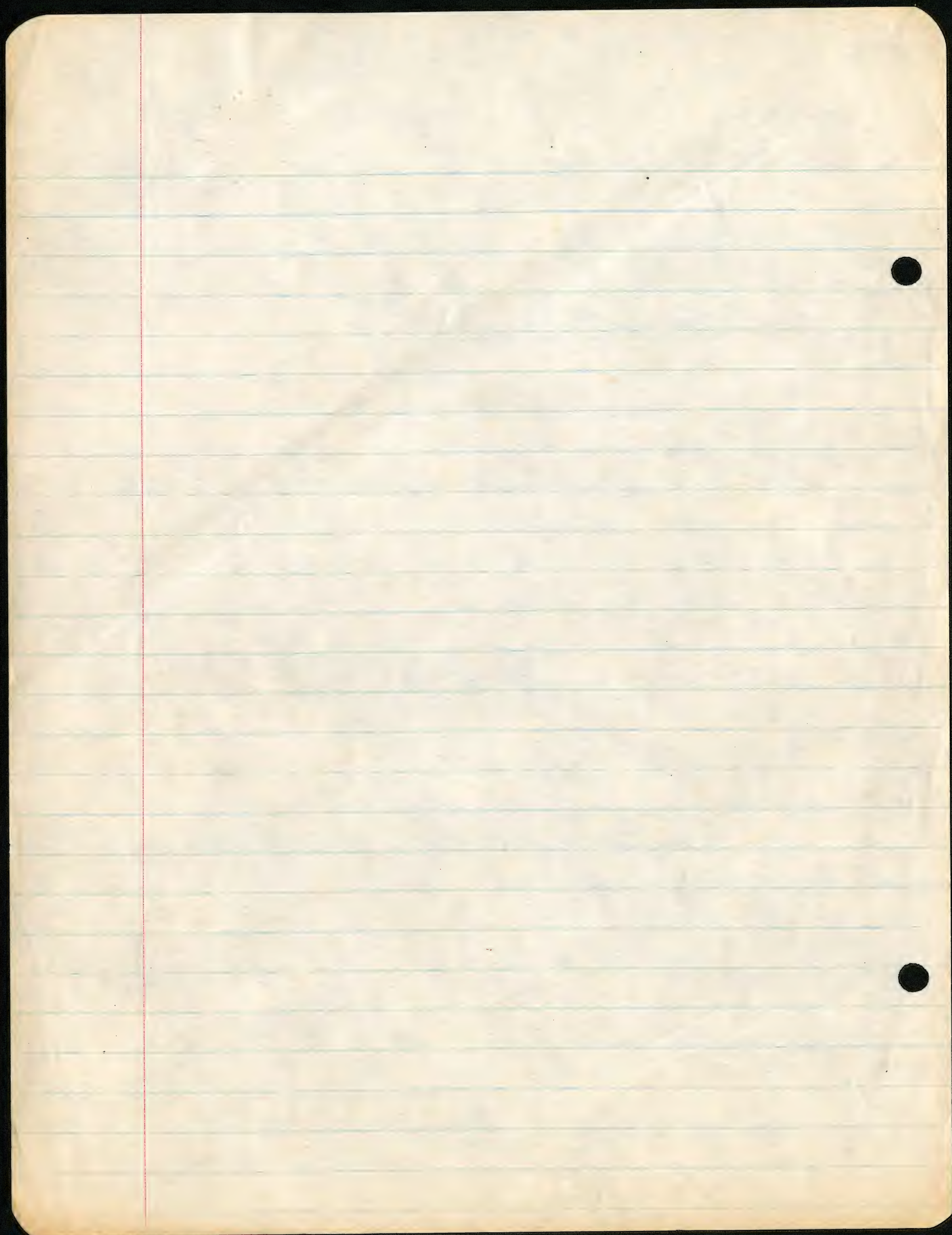
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ing infant. Infant leaves. Ad. ♀ continues grooming herself. Then I see pair adults or sub-adults performing Allogrooming 10 ft away. ♀ goes to join them. One of the latter 2 leaves. Ad. ♀ grooms the remaining one. All animals apparently silent throughout.

See one ind. just sitting, half asleep, on big branch. A couple of juvs. playing not far away. Chasing one another. Quite silent.

10:27. Now see four inds. sitting very close together. 3 ads. or sub-ads., 1 juv. Lots of miscellaneous Allogrooming. All silent.

Several juvs. playing silently. More or less circling sitting group.

One ind. grooms 2 others in succession. Then see "mock fight"? Play wrestling involving 1 juv. and, apparently, 1 adult! Silent.

Then there is sound of branch falling. Followed by burst ALB's and ALB-S's. Then quiet again.

Then rest period over 10:37 a.m. Juvs leave first. Followed by adults!!!

10:43. Brief but obviously real fight between juvs. Wrestling and strutting with hands. With 1 fall. Then the 2 inds. separate. Fall silent. And one immediately does silent Jvd! Obvious redirection!!

Then see young juv. or old infant following close behind a parent. Uttering Fall's constantly. In quite rapid succession.

on.

Another juv. comes down to get bread. Again (?) utters brief M-like notes while coming down. Also while climbing up again afterwards. Surely this is very Aotus-like ?

Hear BB some distance away. Juv. hears "answers" immediately with a single-note BB.

11:11 a.m. Another rest period. Ad. ♀ grooms juv. silent. Note: This ♀ probably is lactating. Probably has inf ant. But infant is not around now.

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Saltator atriceps

— Nov. Jan 27, 1961

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Saltator atriceps

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IV SOME SPECIES OF Saltator.

~~Introduction~~

THE STREAKED SALTATOR (S. albigollis)

~~Introduction~~

Pre-flight patterns (WF, TF, Jm, Cough(?)).

Fighting & escape.

Gaping & head forward

Alarm Notes

HAC - Chuck Notes

WS

Dawn Calling - Doublet Calling

Copulations

THE GRAY SALTATOR (S. coerulescens)

Introduction

Pre-flight patterns

Short Hostile Notes

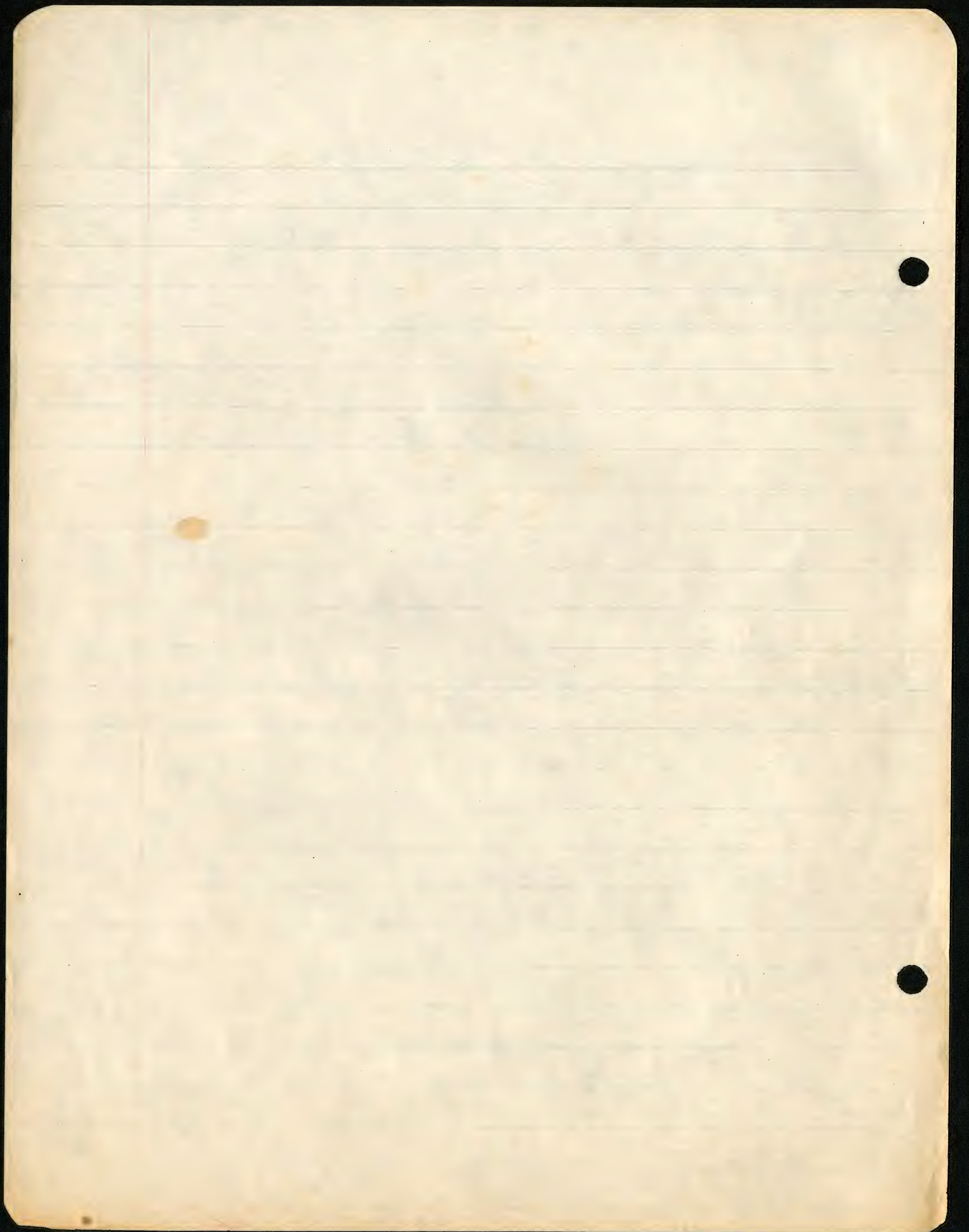
HAC

Pair-formation?

LWS - SWS

Copulation

Head forward & ZZ call

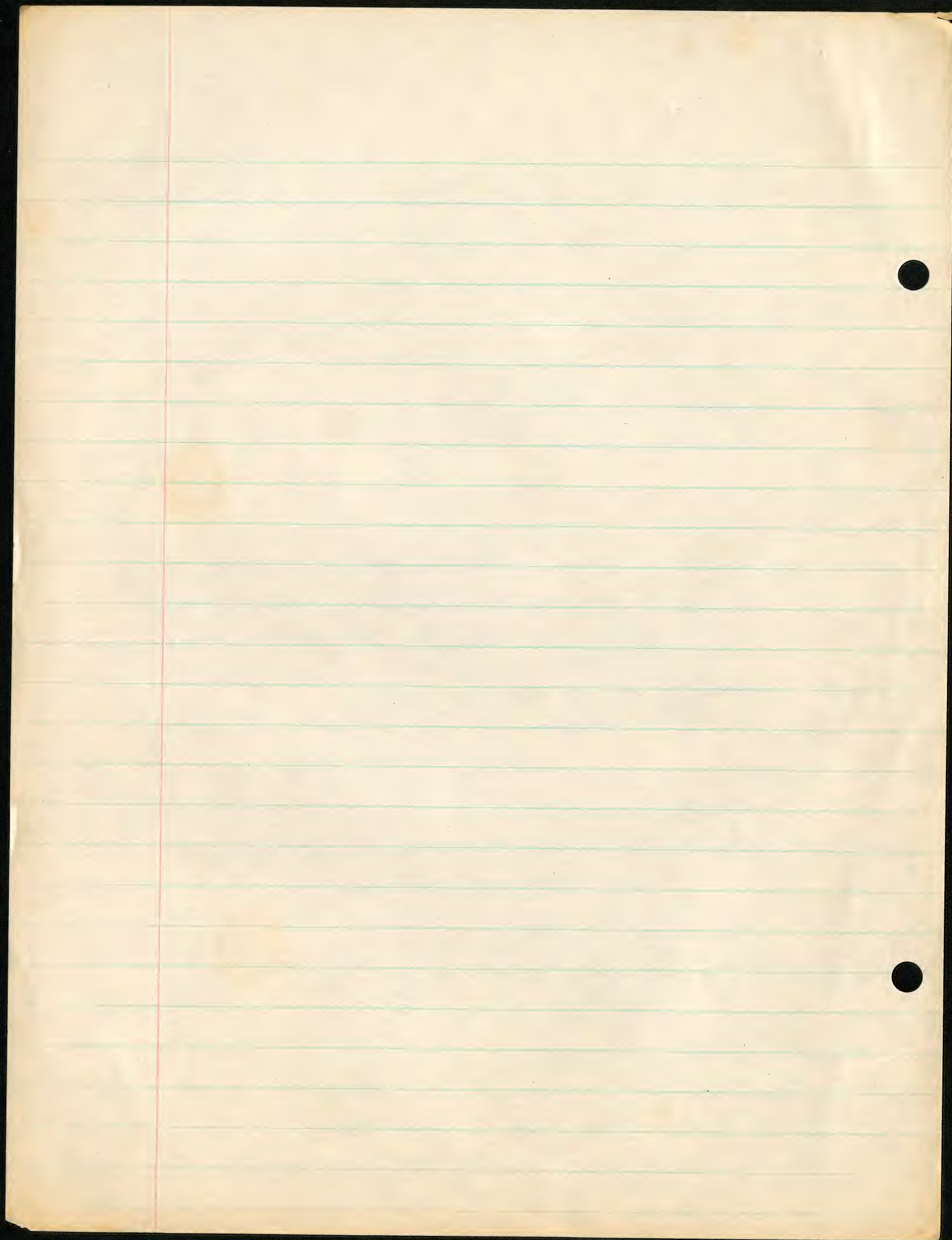


Eschmann (1952) BCI

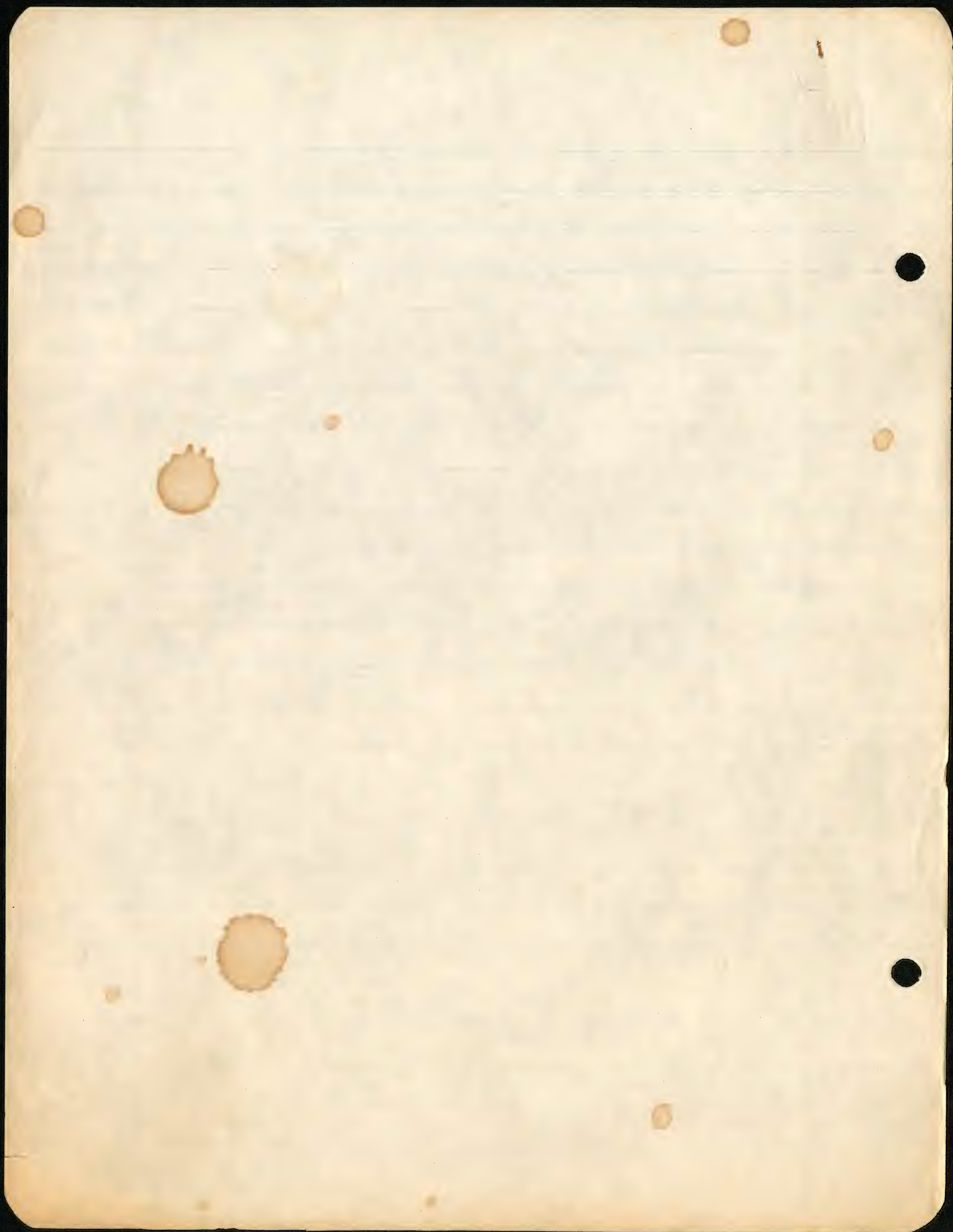
Hellwege (1938).

Moynihan	1962 a	Mixed flocks
	1962 b	Chlorospingus
	1962 c	Some species Ramphocelus
	1963	Green-backed Sparrow
	1964	Yellow-rumped Tanager

Shuteh (1954)



- ✓ I. Chlorospingus
 - ✓ II. Ramphocelus
 - ✓ III. Anemonops cornicatus
 - ✓ IV. Additional Ramphocelus
 - V. Saltator
 - VI. Atlapetes
 - VII. Piranga - Phainopepla - Pitylus - Cyanocorypha
 - VIII. Thrampus
 - IX. Tangara
 - X. Dacnis
 - XI. Coccyzus
 - XII. Euphonia
 - XIII. Sporophila - Oryzoborus
 - XIV. Volatinia - Emberezoides - Phrygilus - Catamenia
- Pyropeetes?
 Thrampus bonariensis?
 Pooecetes?
 Dubusia?
 Pelliophonus?



May 16, 1958
Frijoles

Two species of saltators around here, the Buff-throated
and the Streaked ~~streaked~~ = Buff-throated = marcanus
~~streaked~~ = Streaked = albicollis

One ♂ of each species has sat alone in the top of a large
fairly bare tree, uttering distinctive notes. Both sitting in
quite erect postures, apparently unincubated. The notes themselves
were usually doublets "Wuh-hoo", the second part of each
doublet often having a noticeable quaver. The voice of the Streaked
seemed to be much clearer & purer than that of the Buff-throated.
Both birds occasionally uttered single notes instead of the doublets.
And the Buff-throated (at least) occasionally uttered triplets.

Now one of the Buff-throats came back to the same tree,
sat in the same way, but uttered different sounds. More elabor-
ate. "Duh duh duh duh duh whoooo-ooo". Perhaps
like this — — — — — ??? The first
part very rapid, almost semi-R-like, the latter a nice clear
whistle. The whole thing somehow reminiscent of the WS's of
the Blue and Palm Tanagers — more or less the same "type" of
song. (I think I shall call it WS too). After the bird had sat
and uttered about 3 of these WS's, another Buff-throat came
and landed on a branch a few feet away. Also uttered a few
WS's. The first bird also uttered a few more WS's in the next
minute or so, but there didn't seem to be any particular arr-
angement of the WS's of the 2 birds, i.e. they weren't singing

Saltator, Mar. 16, 1958, II

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in any definite synchronous or antiphonal manner. Then the first bird flew away, and the second did so a little later. Was this a pair?

Both species look rather Thraupis-like, except for the fact that they sit very upright (i.e. more Cardinal or Blue-black Grosbeak-like, I think). Very little flicking of any kind. As far as I know, none of the birds I have seen today (including this afternoon - see below) have done any WF's. One of the streaked Saltators I saw this afternoon did a very few TF's, all very slight, and apparently V-D. (This is particularly surprising in view of the fact that several birds I have watched have been apparently "nervous" of me, looking at me intently and flying off as soon as I move toward them.)

A streaked one flushed this afternoon, immediately flew to the top of a tall bare tree, landing with 3 or 4 "chuck"-like CN's which sounded quite remarkably like some of the "landing" CN's of Palm Tanagers in some circumstances.

Saltator, I.

March 17, 1958

K-6

Flushed another streaked from low shrubbery this afternoon, and the bird hopped around in the nearby bushes uttering quite a lot of sharp, thin, "Trit" Notes - obviously ALCN's. Eventually the bird flew up into a nearby tree and uttered "chuck" Notes (like those described above, yesterday) as it came into land. The "Trit" and "chuck" Notes seemed

Saltator, Mar. 17, 1958, I

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to be quite distinct morphologically, and didn't intergrade at all. It is possible that the "Chuck"s contain an appreciable escape component, but this is probably much less than in the "Tut"s. (I.E., the "Chuck"s of this species — and presumably the Thraupes tanagers as well — are produced by slightly different motivation than the rather similar-sounding "Chuck"s of the Red-throated Ant-tanager — see today's notes on Halcyon.)

Saltator, I

March 27, 1958

K-6

~~Green~~ = Black-headed Saltator = atricaps

Saw one of these birds this morning. Sitting on top of tall bare tree, in the usual erect Saltator posture. Uttering rather thin, high-pitched "Whee-hee" Notes. Presumably CN's

also gave a few high-pitched thin Tulls (Till). Could these be the equivalent of "song"? They were certainly rather reminiscent of Yellow-faced Grackles!!

Saltator, I

March 30, 1958
Barro Colorado

I managed to catch 2 Saltators in my nets at K-6, one streaked and one Buff-throated (both unbanded). I have been keeping them in a small cage, where they have shown a little behavior.

When I caught them in the net (and every time I peck

Saltator, March 30, 1958, II

(4)

one up in my hands) they fight and behave just like Ant. Tanagers. Lots of H-Scr - apparently indistinguishable from that of the Ant. Tanager.

I have now seen a little more of the Fluhung. WF's are certainly rare in both these Saltators (as compared with many other tanagers) and relatively slight. Apparently always coordinated with TF's, and the WF movements themselves are merely very slight (straight) upward movements of the (folded) wings, with little or no spreading of the primaries. The TF's are more conspicuous (and perhaps commoner?). Very different in the 2 species (or at least the 2 individuals I have in the cage). The tail of the streaked seems to be "loosely attached" to the body, it seems to sort of flop around. (It is possible that this bird's tail was somewhat damaged during capture - but I am not so sure about this as I once was). Anyhow the TF's of the streaked are much more conspicuous and extreme than those of the Buff-throat. Usually V-D, with quite a pronounced lateral component. But these TF's are certainly less extreme than those of the Sangre de Toros or Blue black Grosbeaks. The TF's of this Buff-throat are very slight and quick movements, very difficult to see, usually V-D, I think, with little or no lateral component.

These 2 captive birds have done quite a little bit of fighting. Brief face to face pulling bouts, when they happen to come too close to one another on a perch. Usually accompanied (preceded or followed) by definite silent G's, apparently the same in both birds. Sometimes, during the longest and/or most obviously violent disputes, also accompanied by a few

HAC Notes. These sound just like brief, low-intensity versions of H Ser. (This is also true of other species of course; and I am now fairly certain that "HAC" and "H Ser" are really intensity extremes of an essentially single pattern.) This HAC is also accompanied by pronounced opening of the bill like G. This makes it difficult to tell which bird or birds is giving the call, but I am sure that the streaked has, and I think the Buff-throat has too. It is fairly obvious that the HAC is higher intensity than the silent G in many cases at least. It is also my impression that the HAC may be relatively more aggressive than the G. I think the streaked, at least, tends to give HAC's when it is pecking at the Buff-throat most vigorously.

This captive streaked seems to give many more sharp CN's (all or most of which are ALCN's) than the captive Buff-throat. It doesn't actually appear to be more alarmed than the Buff-throat - which would indicate that its ALCN's appear at lower intensities of motivation than those of the Buff-throat.

Neither of these captive birds has a really distinctive pre-flight posture like that of the *Sangu de Toro*; but they certainly tend to hold the body fairly horizontal (i.e. in a position quite unlike their usual sitting posture) when they want to fly a lot or very frequently.


I have twice let both the captive birds loose in the aviary, and each time they have just scuttled off, on foot, into the shrubbery, and stayed skulking. Is this significant? (I think so.)

Saltator, Mar. 30, 1958, IV

⑥

Later this afternoon, after the 2 birds became a little used to the aviary, they emerged and I got a better view of their TF's. It turns out that the Buff-throat can perform quite as extreme TF's as the streaked when it is really highly motivated, i.e. wants to fly very badly but is also greatly inhibited.

Both birds may fan their tails a little, during a between TF's. The usual course of their tails during extreme TF's are also somewhat reminiscent of the Rhamphocelus tanagers

 this sort of thing.

Well! No sooner said than done! I have now seen both birds perform still another type of TF. Extreme V-D, without any lateral component at all.

Saltator, I.

April 1, 1958
Barro Colorado

The escape or alarm behavior of these birds does really seem to be rather distinctive. They both lurked in the shrubbery almost continually throughout their first day in the aviary. Then, yesterday, the streaked emerged, and spent most of its time flying nervously back and forth around the top of the aviary, taking off in alarm every time I made a movement, (i.e. it began to behave like very "nervous" individuals of most of the other species I am studying). Finally, late today, the Buff-throat emerged and began to fly about nervously like the streaked.

Saltator, Apr. 1, 1958, II

(7)

This Streaked is certainly very aggressive. Much more so than the Buff-throat.

Every time the Buff-throat landed beside the Streaked this afternoon, the latter would turn toward the Buff-throat, lower its head & stretch the neck forward (this looked rather like an unritualized version of the FG fluff of the Pico Gordo or the C of the Sangre de Toros - without any fluffing) and utter HAC Notes (sometimes preceded by momentary G's, and accompanied by jabbing pecking int. moves.)

These HAC Notes may have been relatively low intensity. Anyway, they were slightly softer and much less urgent sounding than HScr Notes.

Saltator, I

April 2, 1958
Barro Colorado

The Buff-throat has remained outside the ground school all day, so I guess it is settling down.

This bird has also turned out to be quite aggressive. Just now and again it has pecked at the Yellow-rumped Tanager, which it often perches beside. Some of these attacks have been real "pecking bouts", the Buff-throat standing more or less erect and delivering a real hail of downward pecks upon the poor tanager (who usually retreats fairly soon). The most surprising thing is that all these attacks & aggressive acts have been completely silent! No sign of HScr!! (And there are certainly the circumstances in which the Streaked would be uttering many HScr notes.)

Saltator, I

(8)

April 6, 1958
Barro Colorado

I caught another Buff-throat near K-6 the other day.
Banded yellow left and let loose in the aviary.

The other Buff-throat has been very hostile to the newcomer.
Every time the newcomer comes near the old bird flies or rushes
toward it in a supplanting attack, and the newcomer retreats immediately. All quite ritualized. No sounds.

Saltator, I

April 7, 1958
Frijoles

An apparent dispute between 2 Buff-throats near here this morning. One bird advancing in short flights, the other retreating the same way. No apparently ritualized postures or movements, but both birds uttering calls which I shall term "Rattle-peeps" (RP) from time to time during the encounter. Each RP divided into 2 parts. First a series of short hard notes (most frequently 3, I think, but some times more), followed by a more or less plaintive melodious whistle-like note (also not very long, but much longer than any of the preceding notes).

This looked rather like a territorial boundary dispute, as the pursuer eventually turned away and went back in the direction he came from.

I wonder if this is a variant of the WS I heard on March 16 ??? I certainly think so.

Saltator, Apr. 7, 1958, II

(9)

A single (♂?) streaked has also been around this morning, singing from bare twigs on the top of tall trees. Song itself is very simple. When complete, it seems to be in 2 parts — like so many vocalizations in this group. First 3 notes, rather sharp, and then a longer, more plaintive and whistle-like note.

dub dub dub

whooooo

Sometimes abbreviated by dropping out one of the first 3 notes, sometimes cut off without the last note. Given from an erect sitting posture, apparently unritualized. Wings drooped, but not spread. The whole wings lifted out from body a little, sideways, with each note, (apparently just the physical result of forcing out the sound).

A few of the notes, including some of the notes of the first part and the last longer note also, were accompanied by a "rattle undertone", but this was definitely not present in most of the notes most of the time.

This would certainly seem to be a WS, strictly comparable and homologous with those of the Buff-throat.

This afternoon, back on BCI, I watched the captive Saltator for a little while. Not much — just one interesting fact about the Buff-throats. When I first put the second Buff-throat (yellow-left) in the aviary a few days ago, it did not shulk in the underbrush. Flew back and forth very excitedly near the roof, but gradually settled down rather well. But today it does seem to be remaining very low in the bushes. Presumably due to the aggressiveness of the first Buff-throat, which is strongly dominant, and still attacks yellow-left.

Saltator, April 7, 1958, III

(10)

whenever the latter comes too near Yellow-leg has only perched on the top branches in the aviary this afternoon when the first bird has been down feeding.

I think it is safe to say, as a result of my observations of captive birds and wild ones in several areas, that neither the streaked nor the Buff-throated Saltators have the slightest trace of gregariousness — at least at the present time.

Saltator, I

April 10, 1958
Frijoles

I had a few brief chances to hear WS's by streaked birds near the RR station this evening. Apparently 2 different birds involved. Their WS's quite different.

One bird gave a WS comme ça:

— — — — —

Like the WS

described on Apr. 7, p. 9, but the last long note usually followed by a soft rattle. This "rattle" is really the same thing as the "rattle undertone" mentioned above — and in some of the WS's of this bird, it seemed to begin, somehow, before the last long note was finished. (This soft rattle must be produced by some very different mechanism than the pure notes). This bird gave its WS's repeatedly, again & again, perched by itself, alone in the top of a tree, without apparently eliciting any response by any other bird. Finally flew away and disappeared.

The WS's which were apparently given by another bird were as follows:

Saltator, Apr. 10, 1958, II.

②

Two notes with
a real rattle under-
tone instead of one pure note and one pure soft rattle.
Several times this bird added another doublet to this phrase.

And once it uttered a long very abnormal WS
which was almost pure doublets, very roughly
comme ça: — — — — —

more reminiscent of the WS of the Buff. throat described on Mar
16, p. 1 or the WS of the Blue Tanager.

All the WS's of the flycatchers that I have seen were given
in from a posture like this

Wings drooped.

Tail depressed a little with
each note

Bill inclined
slightly upward

Saltator, I

April 14, 1958
Frijoles



Today, I have watched a Buff. throat singing
long phrase with the usual number of saltator notes, but
I could confirm the fact that there was no rattle undertone with
any of the notes, or any substitution of rattles for the notes.

After a burst of WS's, this bird began to utter doublet
CN's. Much like those described on Mar 16, but perhaps thinner,
weaker, more whistle-like.

Saltator, I

(12)

April 17, 1958

K-6.

I have been struck again & again by how much the "Chunk" Notes (— — —) given by streaked saltatoris flying away from me as they come down to land another perch resemble the similar notes of Palm Tanagers in the same circumstances, almost identical in fact.

I have now heard another streaked sing repeatedly without a trace of rattle or rattle undertone.

Several Buff-throats flying about near me have uttered rather than a weak "Wheet" Notes. Either single, or, when they fly up or off, a brief series (i.e. like some of the tanagers). These birds may have been a little nervous about my presence, so these "Wheet"s may have been either CN's or ALCN's. I think they may at least have been CN's like the "Chunk" Notes of the streaked. (The rhythm was the same when they occurred in series, although the actual sound of the notes themselves was quite different.)

Saltator, I

April 28, 1958

Rio Chucumague

There are a number of Buff-throats here who occasionally come near me when I am sitting down watching other birds. They usually utter the thin weak "Wheet" Notes described above, April 17, with every sign of nervousness, i.e. crouched pre-flight posture and TF's. I am now tending to the opinion that there must be at least a relationship

Saltator, Apr. 28, 1958, II

(13)

strong escape component in these notes

Some of the birds sometimes seem to utter very similar notes which are just a little sharper; and it is possible that there are even more alarm ALCN's, produced by a relatively even stronger escape drive

One bird near me gave a few soft warbles (!) interspersed among a lot of "Wheet" Notes of the less sharp type !!

Saltator, I

May 2, 1958
Frijoles

A single streaked, sitting on a bare limb at the top of a tree, gave WS after WS this afternoon while I was waiting for the train. Each WS was essentially identical with the one outlined on the top of page 11, Apr. 10.

Presumably the same bird. Some WS's were followed by additional — — notes. Occasionally WS's were repeated without a break between phrases. Also occasionally the bird uttered long series of notes comme ça:

— — — — —
— — — — —
— — — — —
— — — — —

Saltator, I

June 29, 1958
Frijoles

While I was watching grassquits and seed-eaters this morning, I noticed, vaguely, that a pair of streaked Saltators was flying about excitedly. Uttering quite a lot of "Chuck" Notes, (almost a

Saltator, June 29, 1958, I.

(14)

used as a regular Landing Call). Then I looked up to find an apparently successful copulation attempt taking place !!! Almost too fast for me to follow, but I am fairly certain that there was no immediate pre-cop display, nor anything in the way of a post-cop display (the 2 birds flew off immediately). The cop itself was quite silent, without ritualized postures. The only thing that was significant was the fact that the ♀ held a m. in her bill throughout the whole performance !!!

Saltator, I

June 30, 1958

Cerro Miquel Lake

Watching a few birds rather casually here.

I can confirm that the WS's of the streaked Saltators here are essentially similar to those of birds near Trujillo.

One of the birds here, however, often gives an abbreviated 3-syllable, presumably low intensity, version of a WS. Like this — — — now or then. This is exactly similar to the brief WS's which my captive streaked Saltator gives — the only WS's it has ever given in captivity, in fact.

It is this tri-syllabic WS which is so reminiscent of the "cho-uh-loh"s of the Rose breasted Thrush Tanager.




I noticed that the pair of streaked Saltators nearest to me always gave a little series of "clunk" Notes — — — whenever one bird came in to land beside another, or when the 2 birds landed together. Definitely a landing and/or greeting call. Quite reminiscent of the "HAC" Notes of the Green-backed Sparrows.

Saltator, I

December 14, 1958

Iquitos

There is a species of Saltator around here which seems to be coeruleus (= ~~coeruleus~~). A single ♂. Looks like the illustration in Phelps, except that the under tail-coverts are more strongly rufous.

This ♂ sings & sings & sings. Apparently unmated. Tends to give his WS's from far more concealed sites than any Saltator I have ever seen in Panama. Well hidden by leaves. (This is probably a real specific or individual difference, but it should be noted that almost all the birds around here are shyer than in Panama.) The WS's themselves are quite distinct from those of the Panamanian forms with which I am familiar; but still quite unmistakably Saltator like. Usually 4 or 5 short notes followed by a longer one:  Might be transcribed by something like "Duh duh duh duh duh Wheeeoooooh." Sometimes another "Wheoooo" type note added on end. Usually rising , sometimes falling .

Saltator, I

December 15, 1958

Iquitos

I had better modify a little some of my statements yesterday. This morning the presumed ♂ Gray Saltator was doing quite a bit of WS from fairly exposed perches high in trees. The WS's themselves just as yesterday.

And he is apparently mated. I was watching one bird sitting high on an exposed perch, preening itself, when its mate flew in. The flying bird started to give rather rapid "Kaa kaa kaa kaa kaa kaa..." or "Kauh kauh kauh kauh..." Notes as it came in, starting at least 5 ft away. The perching bird started to give the same notes. The flying bird landed beside the perching bird, and both continued to give more of the same notes, while they sat almost side by side. These notes were really rather hoarse in quality. I am almost certain that they are strictly homologous with the GHAC of the Green-backed Sparrow, and I shall call them by the same name. The sitting birds gave them from absolutely neutral sitting postures, the bill opening & closing in rhythm with the notes. Then they gradually relaxed, stopped calling, both started to preen, and then they both flew off together.

Well! Well! Well! ♀ Saltator lands on perch by herself. Stands there a few seconds, looking rather nervous. Utters an occasional loud, metallic CN-type note. Might be transcribed as "Auh". Then suddenly assumes St Posture with ♂. Very extreme.

Tail possibly even more raised!



Wings out and partly drooped during the ♂. Head & bill nearly vertical. Tail diagonally raised to a very extreme degree. Probably not spread to any great extent.

Breast lowered very far. Breast & especially belly feathers very very ruffled. Tail apparently not quivered at all. As the ♀ went down into this posture she uttered about 4 or 5 GHAC Notes, and then

Saltator, Dec. 15, 1958, III

(17)

I think, uttered a very soft R! Then shut up for a second, continuing the Q in the extreme St. Then the ♂ flew up from lower down in the tree (he must have been at least 10 ft. from the ♀ when she started her soliciting). He immediately mounted the ♀, without any preliminary display. The copulation was very brief and apparently unsuccessful. The ♀ continued St & Q throughout, I think, but the ♂ slipped off immediately and flew at least several ft. away. One or both birds uttered a burst of GHAC as he slipped off and flew away. The ♀ relaxed her St and stopped Q almost immediately afterwards and flew away too.

Saltator, I

December 17, 1958

Iquitos

I am beginning to think that the reactions between the ♂ and ♀ Saltator described above on Dec. 15 were actually pair-formation or something very close to it. The same ♂, at least, was around in the same area this morning, but he was much less conspicuous, sitting concealed in the shrubbery most of the time, and uttered many fewer WS's. In other words, it looks as if his sex and/or pairing drive had been largely satisfied since I first began my observations of him.

Saltator, I

December 20, 1958

Iquitos

⚡ The breeding season of these Gray Saltators must be quite long.

Saltator, Dec. 20, 1958, I.

(18)

I saw one pair of adults today with 2 fully fledged and well-flying young. Also another pair well-mated, but apparently no nest yet.

This species is quite shy here, in the sense that it tends to fly away quite promptly when one approaches. But most of the birds seem quite stolid otherwise, sitting all but motionless for long periods of time when unalarmed. Presumably correlated with this comparative lack of mobility is the fact that it utters remarkable few CN's. I have only heard one bird utter about 3 or 4 CN's, single notes at quite long intervals, given by a ♂, after WS-ing, before flying off. These CN's are not unlike those of the Rhamphocelus tanagers here, but even more metallic, i.e. even more like the CN's of the Blue-black Grosbeak (although apparently never double).

The ♂ gives his WS's from much the same posture as the other Saltators. Sitting very erect. In some cases, at least, he also tends to point the head & bill diagonally upward, to some extent, at an angle approximately like this →

I am now fairly certain that mates tend to give GNAC whenever they join one another. I even heard 2 birds give repeated bursts of GNAC when they were just sitting (and/or moving about very slightly) in the same tree only a few feet apart. Unfortunately, however, I never got a good view of the birds doing this this morning, so I don't know if it is usually accompanied by particular movements or postures or not.

One juvenile sitting near an adult this morning reacted to the adult in a rather peculiar way which may have been begging. From time to time, especially when the adult turned toward it, it would open its bill and utter a 33 call. This 33 consisted of a

Saltator, Dec. 20, 1958, II.

(19)

series of soft, hoarse, wheezy notes, each of which might be transcribed as "Whaaaah" or "Rhaaaanh". The bill was kept wide open throughout a single series of several notes, and the bird tended to assume a low forward posture during the call. The most peculiar feature of this performance was that it didn't include the slightest trace of Q!

Saltator, I

December 23, 1958

Iquitos

Watching a pair of these Gray Saltators moving around from tree to tree together. Did lots of mutual displaying. Coming into a perch, the bird in the lead would usually give about 3 CN's as it landed. Then would stand a second until the second bird landed beside it. Then both would do a burst of GHAC. In apparently unritualized posture sitting erect as usual, head & bill apparently inclined obliquely upward a little. (They also did a lot of nervous-looking side-to-side turning of the head during this, but these movements might have been provoked by my presence.) Then they would sit quietly near (about 6" apart) one another for a second or so; then, still sitting together, they would do another burst of mutual display, GHAC (and CN's - see below), fall silent again; then do another burst of mutual display, GHAC etc., while they still sat together; then fall silent again; etc., etc., etc.; until finally one bird would fly off to another perch, the second would follow, and the whole process would be repeated again.

During some of these bouts of what I presume were mutual GHAC one or both birds uttered a few CN's of the usual metallic type. It is even

possible that during some of these bouts one of the birds was doing only CN's while the other was doing GHAC (but I rather doubt this).

It is apparent now that this species uses its GHAC even more frequently than the Green-backed Sparrow. Not only a greeting but a display when the males are more or less stationary together. I am sure that stationary Green-backed Sparrows do GHAC much less frequently.

One of the birds during some of these mutual display performances (presumably the ♂) uttered a few abbreviated WS phrases, between the GHAC-CN performances, in spite of the fact that its mate was present!

One of the birds has perched in a tree near me and adopted a most extreme, apparently pre-flight, posture, with drooping wings



Looking long & slim, with tail frequently slightly raised.


The ♂'s of this species seem to have another WS pattern in addition to the one I have described before. Soft, and difficult to determine exactly who is doing it and where it is coming from; but it tends to occur in association with the ordinary WS (which I shall call LWS, from now on), although may LWS's occur without it, and I think that it is usually given by ♂'s when their ♀'s are not too far away. Might be transcribed as "Dah dah whurrurrrr" Apparently given from the usual unritualized sitting posture.

This "whurrurrr" is obviously related to the um notes of the Saltator at BCI.

Saltator, Dec. 23, 1958, III.

(21)

I shall call this type of WS the "SWS", as it is relatively soft. The "Whurrrrr" is much softer than the "Wheeeoooo" of the ordinary LWS, to which it is probably closely related; and even the preliminary "dub"s are probably softer than those of the LWS.


The SWS may well be a very low-intensity and/or greatly inhibited version of the LWS. In this connection, I should mention that what appear to be very low-intensity ordinary LWS's, the initial LWS's long before sunrise, also include only 2 preliminary notes, course ca: 

Saltator I

December 24, 1958

Iquitos

The ♂ Gray Saltator that I have been watching for a few days seems to have another type of LWS in addition to the one I have described before "Duh Wheeeoooo Wheeeoooo dub dub wheeeo"

Course ca: 

Given by ♂ separated from ♀, in usual sitting posture, bill OCB with notes, frequently associated with "ordinary" LWS. The ♂ also gave a few brief phrases intermediate between this "special" LWS and the ordinary type; and the most common variation of this special type itself was the omission of the last note.

I think that the unmated ♂ I watched last week also gave "special" LWS's of this type.

This ♂'s "singing posture" is quite long-necked. Neck feathers quite ruffled during the notes. Lower body feathers somewhat fluffed.

Salpator, Dec. 24, 1958, II.

(25)



between as well as during phrases.

(Quite a good drawing this!)

I have now seen more "mutual displaying" between mates, more or less like yesterday. The ♀ landed in a tree, and the ♂ eventually joined her. They both did GHAC as and after he came into land. They sat side by side for a second in normal sitting postures. Then the ♂ began LWS, the ♀ immediately started GHAC, the ♂ immediately stopped LWS and began to do GHAC too, they did GHAC together for a second, then shut up and sat silent for a few seconds. Then the ♂ began LWS again, the ♀ began GHAC before he had finished the third note of the LWS, he stopped LWS and continued GHAC, they both did GHAC for a couple of seconds, then shut up. This whole procedure was repeated at least 5 times.

This behavior would certainly suggest that the ♀ "uses" GHAC to suppress song (and/or cop. attempts?) by the ♂. This would suggest that the GHAC contains a hostile component — as its actual sound would certainly suggest also. (But I must add that I have never seen the birds make attack int. movs. during GHAC. Except during the one copulation attempt I saw, they have just sat, usually looking toward or facing one another, in apparently quite unritualized sitting postures.)

11
Saltator, I.

(23)
December 30, 1958
Frijoles

Watching a pair of streaked Saltators here. One bird flying about from tree to tree. Each time it came in to land, it uttered a series of notes. These are obviously what I have been calling "clunk" notes earlier (e.g. Apr. 17, p. 12), or, at least, closely related to them; but I noticed today that they are rather hoarse. They sound, in fact, very much like the GHAC of the Gray Saltator. The notes of the streaked, however, seem to be somewhat sharper-sounding; and with somewhat longer pauses between notes. The notes of this streaked Saltator this morning seemed to be exactly intermediate, in form, between the GHAC of the Gray Saltator at Iquitos and the usual "landing CN's" of the Thraupis tanagers!!! (This would suggest that the "GHAC" is more closely related, phylogenetically, to the CN's of tanagers than to the HAC or Hser patterns of tanagers.) The bird today gave its "clunk" GHAC notes (which I shall call just GHAC from now on) both when it landed near another bird which I presumed was its mate and when it landed some distance away, (although the other was always present, I think, in the general area — say within 20 or 30 ft.) It is possible that the mate responded by giving GHAC in return, when the first bird landed near it. But I am not sure about this.

The only other sounds uttered by these 2 birds were a few single "Trit" CN's, quite like those of the Gray Saltator at Iquitos, although probably less metallic. I saw no reason to believe

Saltator, Dec. 30, 1958, I.

!!

(29)

||| that there were particularly alarm reactions (cf. Mar. 17, p. 2)

Saltator, I

June 30, 1959
Rio Piedras

I watched a pair of Black-headed Saltators moving through the trees near second growth near the river here. Probably feeding.

Very very loud & noisy. Constant call notes and/or alarm notes (possibly provoked by me). These notes were extremely variable, ranging from high-pitched & rather penetrating "Trit"s to very harsh "Chank"s. Also some metallic bell-like notes, quite like some notes of the streaked Flycatcher and the Blue-black Grosbeak. These notes usually uttered as single notes, occasionally double. Double notes of the metallic bell-like type were particularly reminiscent of the Blue-black Grosbeak. Bill usually opened & closed with each note, but apparently no other ritualized postures or movements.

Every time one of the birds landed near the other, they both performed GNAC. Made up of about 4 hoarse, harsh, "Chank" or "Kank"-like notes. Perhaps with an "R" undertone. Very rapid but rather irregular in rhythm. Almost certainly more irregular than the GNAC of the streaked Saltator and probably more irregular than the GNAC of the Gray Saltator. Perhaps comme ça:

Often ending on a relatively prolonged rising note, which sometimes, but not always, became clearer & more whistle-like in quality.

The GNAC was uttered from an ordinary, unritualized sitting posture. Bill open, with mandibles moving in rhythm with the call.

Later on this morning, I heard some most peculiar calls uttered by a bird which was probably a Buff-throat. The bird definitely had a buffy throat.

Saltator, Jun. 30, 1959, II.

(25)

+ (although its plum was whitish). The calls it uttered appeared to be WS's, but were quite unlike any other WS's of the species I have ever heard. Possibly provoked by and directed toward me. Some of these calls might be transcribed as "Tsiwit tsiwew", while others were preceded by one or two uttered notes: "Tsit tit tsiwit tsiwew". All most peculiar!

Saltator, I.

July 1, 1959.
Rio Piedras

Back at the same place today.

Watching another Buff. throat. Sitting alone, high in tree, over second growth. Doing a lot of preening, interspersed with song, like soft warbling phrases. Obviously homologous with the call described immediately above, but slightly different in form. I think this difference in form was purely an individual difference — as the bird performing today was almost certainly different from the one I watched yesterday. Most of today's calls might be transcribed by something like "Tsit tsit tsew-whewoo". I think I shall call all such phrases (including calls such as the one I heard yesterday, "Wbl"s. Wbl's are certainly quite different from the WS's in form — and also much softer. The bird giving Wbl's this morning certainly gave some of them when there were no other Saltator's available in the neighborhood; but it also gave a lot apparently as response to WS's coming from several yards away. (I couldn't see the bird giving WS's, but the WS's themselves were quite typical of either the Buff. throat or the streaked, and I presume that they were being uttered by the mate of the bird giving the Wbl's.) The bird giving the Wbl's apparently started every Wbl after the other.

Saltator, July 1, 1959, II.

(26)

bird had started the WS, and then continued the Wbl a few seconds after the other bird had stopped the WS. The ratio of Wbl's to WS's was obviously 1 to 1 in such circumstances - 1 Wbl answering a single WS.

I also watched the same pair of Black-caps as yesterday. Behaving in much the same way as yesterday. Lots & lots of CN-like notes whenever disturbed by me (but usually quite silent otherwise). I think I shall have to give the different types of these notes different names. I shall call the harsh "Chauh"-like notes "CHN"; and the high pitched "Trit" note TSN. I think that the particularly bell-like, Blue-black Grosbeak-like notes may be nothing more than variants of the TSN. It is my impression that both birds occasionally gave all types of these notes; but certainly for a long time one bird consistently gave CHN's while the other consistently gave TSN's. Possibly a sexual difference ???

I wonder if this two type of "CN" arrangement is homologous or analogous with the similar division of CN's in Rhamphocelus tanagers.

Both birds also gave a lot of GHAC today. Again much as yesterday. But I noticed that a bird often uttered GHAC when it landed by itself, at least several feet from its mate, as well as when landing just beside the mate. I.E. the GHAC of this species is uttered in very much the same way as that of its relative (see Dec. 30, 1958, p. 23). There is undoubtedly considerable variation in the GHAC's of the Black-caps. One bird today uttered quite a lot of GHAC's, quite close together, which might be transcribed as "Trit trit tchantchantchantchant."

— — — — —

This appeared to be essentially composed of 2 TSN's followed by an accelerated series of 4 CHN's. The bird uttered them when it was sitting, more

Saltator, July 1, 1959, III,

(217)

several feet away) from its mate. The whole performance looked very much like "song".

Once when one bird landed close beside the other, the latter briefly assumed a posture which may have been a weak int. mov. of ft. Quite silent.

Saltator, I

July 7, 1959
Frijoles.

I found a pair of Black-caps here too, with a nest, with at least one young (probably half grown, as far as I could tell from a distance) in it. In general the birds behaved much like the birds I have seen at the Rio Piedras. Lots of TSN's, CHN's, and GHAC's.

When I came particularly close to the nest, the only parent that was around at the time uttered lots of single CHN's, and very few TSN's. Might suggest that the CHN's are relatively high intensity.

One bird was heard to utter double notes, 1 CHN — 1 TSN, come on. — — — — — When I

wasn't very close to the nest. So it is definite that these 2 types of "CN" are not strictly segregated according to sex. I also wonder if these double notes are related to the double notes in the WS's of the Florida Red-bellied Woodpecker, and some of the introductory notes to the songs of the Green-backed Sparrow.

One of the Black-throats sat alone in a tree for several minutes, when I was far away from the nest, and uttered at least 3 bursts of "GHAC". Sounded quite like the GHAC's I have heard before. The bird just sat still while it uttered these phrases. Such facts might suggest

Saltator, July 7, 1959, II.

(28)

that this species has lost (or is losing) a song pattern like the "WS" of the other Saltators (see below), and that it uses its GHAC as a "substitute" for the "WS" of the other species.

I also watched some streaked Saltators this morning, apparently unmated males, doing a lot of singing while separated from their mates. Much as before. I did notice, however, that sometimes especially early in the morning, a bird would utter a nearly "random" jumble of "WS" notes, high & low notes not uttered in regular alternation like the notes of typical WS's. Sometimes reminiscent of the short jumble-like notes of Green-backed Sparrows early in the morning (see today's notes on Arremon).

One streaked certainly uttered a complete GHAC, once, when perched in a tree by itself, when the mate was apparently not in the neighborhood.

So far, it would seem that the streaked and the gray Saltators are more or less intermediate between the Black-capped Saltator and the Buff-throated Saltator in behavior.

One thing I have noticed both here and at the Rio Piedras is that the three local species seem to overlap extensively without any indication of hostility between any of them. This morning, the same perch, at the top of a tall tree, was used alternately by a streaked Saltator (who gave WS's there) and a Black-capped Saltator (who gave GHAC's and/or "CN"s there).

The streaked Saltators here do not seem to be birds of the low undergrowth like the streaked described by Shuteh. They usually or always give their WS's from perches quite high in trees, at least 20 ft above the ground, and sometimes considerably higher. (It may be significant, incident

Saltator, July 17, 1959, III.

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ally, that I have never seen a Streaked perform anything like a "Flight Song" here.)

At the Rio Piedras, the only species I have seen really high in tall trees (70 ft or more) is the Buff-throat. Both the Black-caps & Streaked seem to stay lower (at heights of approximately 12 to 30 or 40 ft), at least most of the time. The Streaked is the only species I have seen in very "open" second growth, in bushes & trees on the edges of pastures, but it also occurs quite frequently in the thicker second-growth where I have been watching the Black-caps.

I think I shall drop the term "WS" as applied to Saltators, and just use the term "song" to a court.

Saltator, I.

April 12, 1960
Puerto Rico

Black-capped Saltators are by far the commonest species of Saltator in the neighborhood here. We saw at least 3 pairs of Black-caps here in the first half mile or so of the Las Cruces Trail. (The only other species of Saltator I think I have seen here is the Buff-throat. I may have seen one or two apparently single Buff-throats around; but I cannot be sure of this.) The Black-caps were very noisy and conspicuous; and may well have been beginning the breeding season.

I think that I understand the song & related patterns of this species a little better now.

We came upon one pair around 7:00 a.m., which appeared to be engaged in a territorial dispute. At least 3 birds flying around from

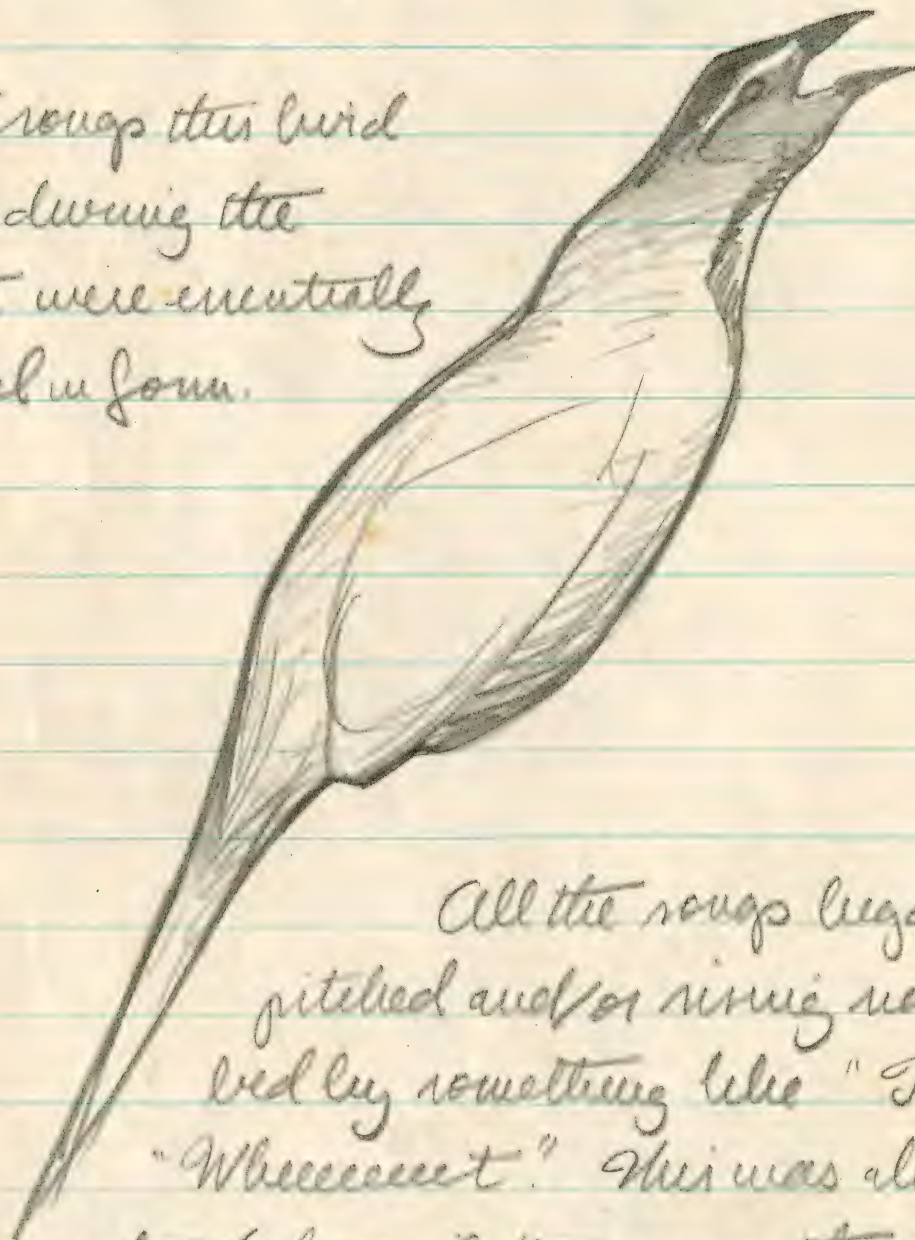
Saltator, Apr. 12, 1960, II.

(30)

tree to tree in a very rapid and excited manner. One of the birds (the ♂ of the defending pair?) paused from time to time to utter songs. In a posture common to:

All the songs this bird uttered during the dispute were essentially identical in form.

Bill up, head small, neck elongated.

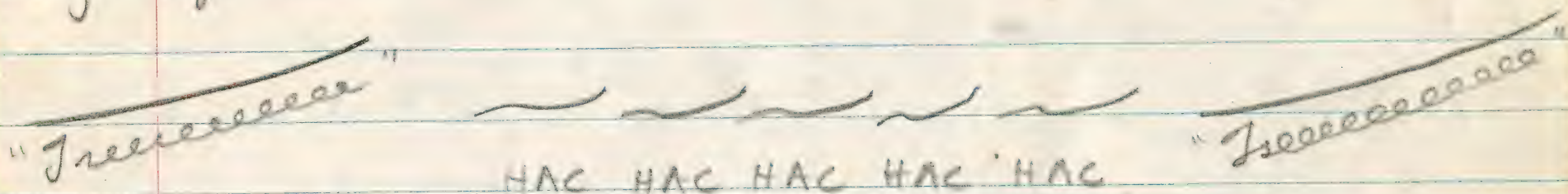


All the songs began with a single long, high pitched and/or rising note, which might be transcribed by something like "Tseeeeeee" or "Whreeeeet". This was always followed by a series of rapping notes (obviously the same as the notes I called "GHAC" on previous pages, e.g. on June 30, 1959, p. 24). Presumably just a type of HAC in these circumstances. Some of these HAC notes might be transcribed by something like "Chuk-a" — although this probably greatly exaggerates the briefness of the downstroke (which was never more than slightly indicated). I think that the series of HAC notes following the initial "Tseeeeeee" or "Whreeeeet" note usually included 5 or 6 notes. These series of HAC notes were always or almost always followed by a single "Tseeeeeee" or "Whreeeeet" note exactly like the one that introduced the performance. This last "Tseeeeeee"

Saltator, Apr. 12, 1960, III.

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Note always marked the end of a song phrase. There was always a pause after these last notes (before the beginning of a new song phrase). All the song phrases during this dispute might be represented by the following diagram.



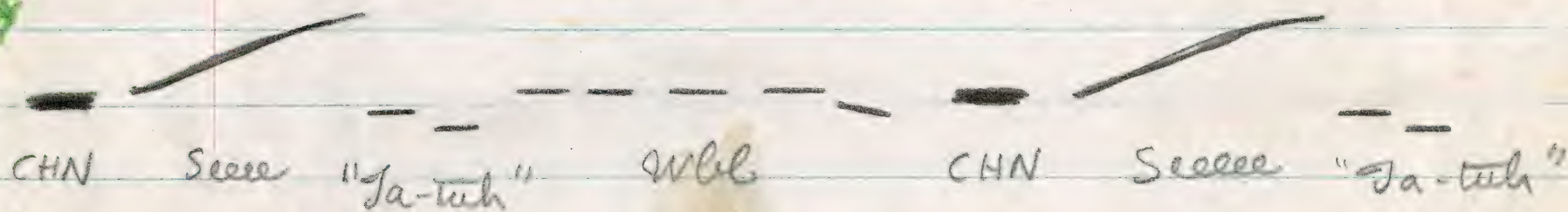
I shall call these "T" or "Wheree" introductory and terminal notes "See" Notes, and the HAC Notes during song phrases "SHAC".

After a few minutes, this dispute apparently died down. I think the intruder(s) must have left. After this, we could no longer see the birds well, but one bird (presumably the ♂ of the victorious pair) uttered song phrases after song phrases, at few second intervals. These song phrases were rather different from those uttered during the heat of the preceding dispute. They always began with what might be called an "introductory" phrase of 3 or 4 notes. (I shall abbreviate this term to "Intro" throughout the following pages.) Many of these song phrases were preceded by a few single CHN's. The first note of the Intro phrase of the songs was also a CHN, apparently identical with the ordinary single CHN's. This was followed immediately by a See Note, quite like the See Notes during the dispute described above. This in turn was followed immediately by a couple of relatively low-pitched and/or descending notes: "Ja-tuh" or — — This marked the end of the Intro phrase.

What followed next was rather variable. In many cases, a brief

warbling phrase occurred after the Intro. This might be transcribed by something like "Fee-tee tee tee-yoo"

In other cases, the Intro was followed by a few SHAC Notes and then the warbling phrase as above. (I shall abbreviate this warbling phrase as "Wbl".) Both types of songs, those with both SHAC & Wbl and those with Wbl but without SHAC, usually ended with another Intro, just like the preliminary one. Thus a song phrase with Wbl alone might be represented by the following diagram



I only caught one glimpse of the bird while it was uttering these songs. It appeared to be sitting alone, probably in the same posture as drawn above on p. 30.

I think that these songs must have been less strongly hostile than the songs with SHAC but no Wbl during the preceding dispute. It also seems likely that the songs with both SHAC and Wbl are more strongly hostile and/or more aggressive than the songs with Wbl but no SHAC.

Some of these songs after the dispute may have been "triumph" songs — whatever that may mean.

Later on we came across another pair. Obviously disturbed by our presence, but reluctant to leave the neighborhood. Presumably its song territorial. One or both birds kept flying away, and then returning to the same tree near us. They may have had a nest there.

In any case, as a result of all this flying back & forth, the nest

Saltator, Apr 12, 1960, V.

(33)

as were frequently widely separated from one another. One bird (the ♀?) uttered single CHN's when separated from its mate. What I presume was another bird (the ♂?) uttered bursts of 2 or 3 notes which appeared to be partial or complete Intros, without any other song elements, in similar circumstances.

CHN seeeee or CHN seeeee
"Tuh"

When these 2 birds were together, one or both of them uttered more "complete" song patterns. An Intro phrase of 3 notes, followed by SHAC, followed by Wbl, followed by a long descending note! This might be represented as follows:

CHN seeeee
"Tuh" "chuk-a-chuk-a-whew-whew-whew-ee-oooo
SHAC SHAC Wbl Wbl

These songs were repeated quite frequently. Essentially similar in form every time. Apparently always ending with a long descending note.

Again I couldn't see these birds very well - so I couldn't tell what exactly was provoking these performances. Some of them may have been "greetings". Some were certainly hostile and provoked by our behavior. Every time I made a vigorous movement one or both of the birds responded by uttering one or more of these songs.

I have no idea if the terminal descending notes of these songs were an individual peculiarity or not.

I should mention, before I forget, that the only part of any of these song patterns which is really very reminiscent of the typical

Saltator, Apr. 12, 1960, VI

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songs of the streaked and Buff-throated Saltators (the patterns I have called "WS" on preceding pages) are the Intros, with their

01

arrangements.

I only caught one glimpse of the bird which gave the song with descending terminal notes while it was actually singing. At this time, it was sitting in a posture which was either very similar to or identical with the one drawn on p. 30.

at one time, while we were watching this last pair, I saw that one bird was sitting in a posture which looked like a low intensity indication of the soliciting posture of the Gray Saltator. I couldn't see its mate at the same time, so I don't know what provoked the posture. In any case, the performing bird stayed in this posture for quite

a long time, perhaps a minute or so, without uttering a sound, and then flew off.



Saltator, I

April 21, 1960
Frijoles

I watched a single Buff-throat, presumably ♂, sing by himself today. In more or less ordinary, unritualized, erect sitting posture. The most interesting feature of this performance was that the song phrases were largely or completely Wbl's, sometimes preceded by notes like the See Notes of Black-caps, and/or followed by descending whistle-like notes like those of the Black-cap described above on Apr 12, 1960, V. A typical song phrase might perhaps be transcribed by something like

35

"tuh tuh tuh"

"Vsevolod"

We

None of the phrases appeared to provoke any response from any other bird; and the singer eventually flew off.

Saltator, I.

April 28, 1760
Frijoles

Watching an apparently single Black-cap near the RR station this morning. Sitting high in a tree by itself in a completely unritualized posture. Uttering alternate TSN's and CHN's, almost steadily for minutes on end!!! Bill opening & closing with each note. The alternation of these 2 types of notes was really quite exceptionally regular. The only irregularity was the occasional interjection of a single extra CHN.

This whole performance was apparently identical with the performance of the bird described above on July 7, 1939. These long series of alternate notes must be a regular component of the display repertoire of this species.

I was again reminded of the "Whit-chu"s of the Green-backed Sparrow when I heard this Saltator. This resemblance was increased by the rhythm of the alternating notes of the Saltator, which was

Saltator, Apr. 28, 1960, II.

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as follows: TSN-CHN-pause-TSN-CHN-pause-TSN-CHN-pause
n, etc. etc. etc

I should not be surprised if the original form of "song" in the Saltator - Green-backed Sparrow group was a "warble". This "warble" may well have been largely or completely replaced in the course of evolution by louder but simpler patterns based on alternate notes.

Saltator, I.

May 6, 1960
Barro Colorado

I have had a "pair" of Buff-throats in an outside cage for a long time. One unbanded, the other banded yellow. They have not been very active - until today.

Early this morning, I noticed that the yellow bird, presumably ♂, was sitting on a perch, uttering lots of distinctive notes. These notes were sometimes unitary, and at other times faintly bisyllabic or trisyllabic (more often trisyllabic than bisyllabic). A typical series might be transcribed by something like "Whew Whee-ce-oo Whew Whee-ce-oo Whew Whee-ce-oo Whew Whew Whee-ce-oo Whew Whee-ce-oo Whew Whee-oo". He opened (very slightly) and closed with each note of such a series. During such series the bird sat in an apparently virtualized diagonal-upright sitting posture, with wings usually or always meeting over the rump, and the tail held in line with the body (not bent more strongly downward). When this yellow bird uttered such series, it was usually or always sitting on a perch some distance from the other, unbanded, bird in the cage. As far as I could tell, the unbanded bird did not respond to yellow's perform-

Saltator, May 6, 1960, II.

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discussion any way.

All these performances by Yellow were very reminiscent of the "Keeyoo" singing of my captive A ♂ Sauze de Toro. This, "Whew" singing (as I shall call it) must, I think, be strictly homologous with the "Keeyoo" singing of the Sauze de Toro.

These "Whew" and "Whee-ce-oo" Notes are certainly quite different from "Wheet" CN's (see below) but they may be closely related to, or even identical with some terminal parts of some Wbl's (see below). I think that they are fairly distinct from the fee Notes of the Black Caps, and (almost certainly) the fee Notes of this species (at least the introductory fee Notes of the Buff-throat described above on Apr. 21, 1960, p. 35).

Every once in a while Yellow would interrupt his "Whew" singing to utter a brief, not very loud Wbl. Some of these Wbl's included 5 notes, while others included 3 notes. "Trit trit tree wee yoo" and "Trit tree yoo" (Yellow may well have uttered 4 note Wbl's too, but I didn't actually distinguish any of this type). These Wbl's were not introduced or followed by any distinctive fee Notes or whistles or anything else. I think they were accompanied by the same postures as the "Whew" singing, and they did not appear to provoke any response from the unbanded bird.

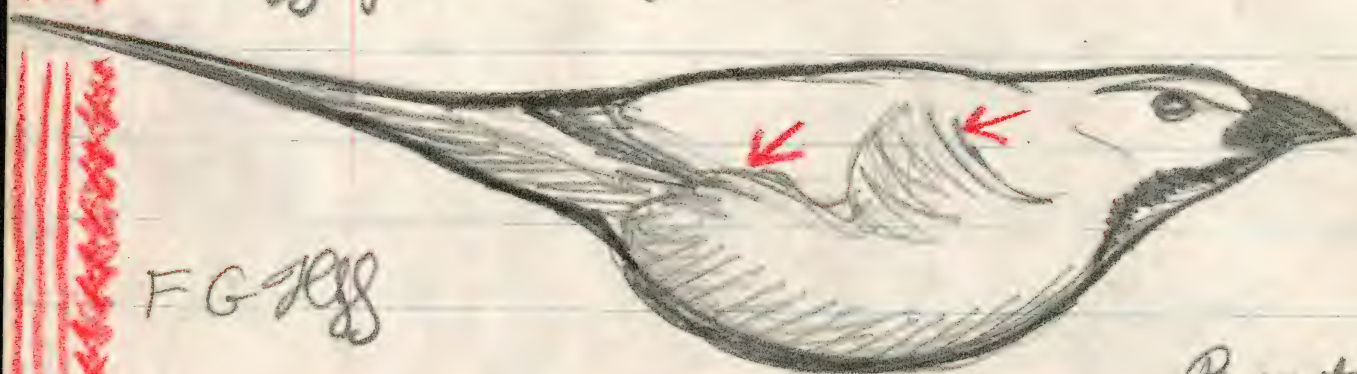
I imagine that the "Whew" singing may well be provoked by some frustration or the writing of some pairing or sexual drive, but the Wbl's may be largely or completely hostile (see below).

After lunch, I put 2 new birds in the same cage with Yellow and the unbanded bird. One of these new birds was banded red, and the other was banded blue. These 2 new birds had been kept together in a small cage inside the animal house for a month or so.

The introduction of Red & Blue provoked a lot of hostility from

Yellow.

Yellow began by assuming a posture very much like the F & G of the Pico Gordo Euphonia.



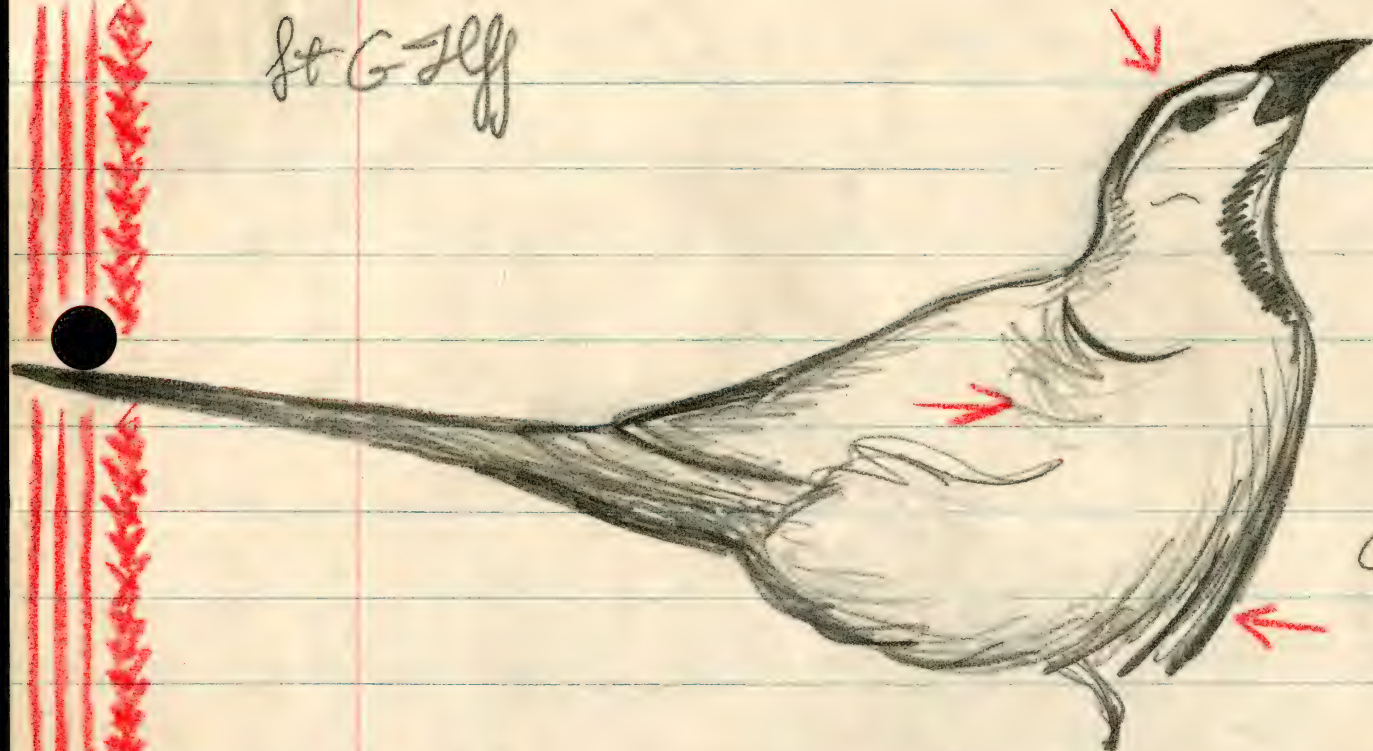
Dark crown almost or completely invisible!

FG HSS

Breast & belly feathers spread laterally to a very extreme degree (as much as in my drawing of the G HSS of the Pico Gordo — but not lowered very greatly). Viewed from the side, the most peculiar feature of this posture was the way in which the fluffing of the breast feathers was separated from the fluffing of the belly feathers (indicated by →'s above). It looked almost as if the bird had a "false wing".

This FG HSS Posture (as I shall call it in this species also) was quite silent, and was not accompanied by any G. It was combined with quite a lot of irregular pivoting, which appeared to be unritualized and also some irregular "bowing". This bowing was considerably less frequent than the pivoting, and appeared to be equally unritualized — as such. In some cases, it was obvious, however, that the posture at the top of the up-phase was itself extremely ritualized. I shall call this ritualized posture St G HSS. It is obviously a combination of the same G HSS as in the FG HSS with an "ordinary", not very exaggerated, "therapeutic" St Posture. It was also silent, and not accompanied by any trace of G. It is drawn on the next page.

St G-Hff



Notice shape of head.

Small-headed in appearance

Notice "frontal shield."

(The way in which the white eyebrows are so conspicuous in the St G-Hff postures — it is possible that the white feathers are even raised — while the dark crown is obscured or hidden — is very reminiscent of the display of the yellow forehead feathers, and the hiding of the dark crown feathers, in the St G-Hff patterns of the Pico Gordo.)

While the Yellow ♂ was performing these patterns, he faced the Red newcomer almost directly. Then the Yellow ♂ began to perform supplanting attack after supplanting attack upon Red, trying to peck Red whenever he got close enough, and succeeding not infrequently. Red tried to escape without any defense in most cases. Every once in a while Yellow would interrupt his attacks to perform more St G-Hff patterns. Usually St G-Hff, with little or no "bowing" and/or F G-Hff. Some of his St G-Hff's in the intervals of attacking may have been even more extreme than the St G-Hff's before Yellow began to attack. (Actually, my drawing of the St G-Hff is primarily based upon postures between attacks).

Both birds were silent during almost all this attacking & escaping. I did, however, hear one "Whew" note and one brief Wbl in the middle of the excitement. Probably uttered by Yellow. The rarity of "Whew"

Saltator, May 6, 1960, V.

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no "songs" & Wbl's during this encounter would indicate that neither is predominantly hostile.

One or both birds occasionally uttered a single "Wheet" call during this attacking and escaping. Some of these "Wheet"s were certainly uttered by Yellow, but it is also possible that a few were uttered by Red. I could not determine if these "Wheet"s were hostile or purely "comotory".

Once (unfortunately when I wasn't looking) one bird uttered a series of 2 or 3 hoarse "Whank" notes - obviously HAC or something closely related to it.

After a while, Red obviously became very tired. Yellow also began to pause a little more frequently between attacks. Then Red sat in a "submissive" ruffled posture whenever Yellow wasn't attacking.



Submissive Ruffle + G

Notice CR (possibly slightly exaggerated in this drawing)

Belly feathers even more strongly ruffled than breast feathers

(It is interesting that this species does CR when escape is obviously predominant over attack).

Once, when Yellow approached Red while the latter was sitting in this Submissive Ruffled Posture, Red just G'd instead of retreating. This seemed to be effective as threat as it caused Yellow to retreat himself temporarily. And from this one encounter, Red kept his bill closed all

Saltator, May 4, 1969, VI.

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the time he was in the Submissive Ruffle.

Finally, after a particularly vigorous attack by Yellow, Red dropped to the ground and crouched motionless under a bush!

Yellow remained sitting on a high perch after Red dropped, and then uttered 3 or 4 Wbl's, one right after the other. "Triumph Song" (like the "Triumph song" of the Black-Cap described above on Apr. 12, p. 32). Possibly due to a sudden relative decrease in the strength of Yellow's escape drive, and relative increase in the strength of his attack drive, due to Red's sudden disappearance from sight ??? In any case, Yellow did not make any attempt to approach either of the other birds in the cage after his Wbl's.

I then took Red out of the cage, as it was beginning to look much the worse for wear.

After Yellow settled down again when I left the cage, it just sat in a rather sleek, alert-looking (pre-flight?) posture, for a few seconds. Then he performed quite a lot of BW movements. Displacement ????

Then he performed a few not very energetic supplanting attacks upon Blue, whom he had completely ignored before then. None of these supplanting attacks upon Blue was accompanied by any display of any sort.

This would indicate that Yellow distinguished between Red & Blue in some way. I think that Red must be ♂ and Blue ♀, and that Yellow could distinguish their sexes by their appearance.

I stopped observation at this point, as I thought that the birds were slightly nervous about my presence.

Saltator, I

May 7, 1960
Frijoles

Watching a single, presumably ♂, *Struthio fallator* "sing" here. In usual erect posture, with tail-down. These songs seemed to be more or less typical of the most common forms of song of this species. Relatively slow, with relatively longer notes than any of the WBL's of other species, with which it may be more or less completely homologous. The complete songs of this bird might be transcribed as follows:

dub dub-dub wheeeooooo mmmmm

I am not absolutely certain that the diagram of the 4th note, which is relatively long and whistle-like is really correct. It is possible that the pitch is descending in all or most 4th notes.

It is also possible that there is considerable variation in the 4th notes from time to time. It is possible that some are ascending while others are descending.

This is obviously the same thing I called "WS" in my earlier notes on the Streaked C. (Apr. 7, 1958, p. 9, and Apr. 10, 1958, pp. 10 and 11).

I am sure that this must be closely related to the songs of other species of *Salpator*, but the exact details of the relationships are still obscure. It is conceivable that the whole "complete" song of the streaked, such as sung by the ♂ I watched today, is strictly homologous with the WBL of the Buff-throat. More probably it is strictly homologous with the whole "WS" of the Grayish, and the WBL & See Notes of the Buff-throat and the Black Cap. If so, it is

Saltator, May 9, 1960, II

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presumably only the first 3 notes of the streaked song, the — —
which is strictly homologous with the Wbl of other species.
If so, the homologue of the Wbl has been somewhat slowed down
in the song of the streaked.

The bird I watched today also uttered quite a lot of "incomplete"
songs. There were all — — — — — or

Saltator, I

March 28, 1961
Frijoles

Watching some birds in the Frijoles area this morning. From
app. 6:15 a.m. to approximately 8:00 a.m.

I watched one streaked (presumably ♂) sitting by itself in the
top of a tree singing a rather distinctive "song" for at least 15 minut-
es, almost without interruption. A series of clear, whistled "Kew"
Notes, occasionally interrupted (at irregular intervals) by a single high
or pitched, slightly rattling "Kree" Note. Comme ça: "Kew kew
kew kew kew Kree kew kew kew kew kew Kree kew kew kew
kew kew kew kew Kree"

The bird sat in the usual unritualized singing posture while
uttering these notes.

The bird was uttering these notes when I arrived, but stopp-
ed when full daylight arrived. This would definitely appear to be a
form of "dawn song".

Saltator, Mar. 28, 1961, II.

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The whole performance was quite remarkably reminiscent of the "Keeyoo" song of the Sangre de Toros and the "Wheew" singing of Buff-throated Saltators.

The fact that all these performances are essentially "dawn song" would suggest that they are all high intensity.

I heard a number of "songs" uttered by solitary Buff-throats at various times this morning. All well after daylight (long after the "Kew" song of the streaked described above. All these songs were largely or completely Wbl's. Some might be transcribed as "Trit tsawhee whee". Others might be transcribed as "Trit tsah-ha-whee". All rather twittering. Uttered from apparently unritualized sitting postures.

Sometimes, I think, there were 2 "Trit" notes at the beginning of these Wbl's. The single "Trit" notes (and possibly the double "Trit"s) at the beginning of these Wbl's were quite sharp and then and rather plaintive. Rising in tone — such notes may be more or less closely related to the "Wheet" notes I have heard uttered by Buff-throats before, apart from Wbl's — see, for instance, my notes of April 28, 1958, p. 12. I saw one bird sitting by itself in the top of a tall tree this morning which uttered lots of single "Trit"s without Wbl's. These "Trit"s may be largely or completely homologous with the SN's of Palm and Blue Tanagers and the PCN's of Sangre de Toros. (I doubt if either the "Trit"s and/or "Wheet"s are alarm notes.) I think that the "Trit"s which were associated with or in the Wbl's of the Buff-throats this morning may not have been "integral" parts of the Wbl's (in the same sense as the succeeding 3-note phrases or 3-syllable notes).

It is obvious that the "Rattle-pops" of Buff-throats described

Saltator, Mar. 28, 1961, III.

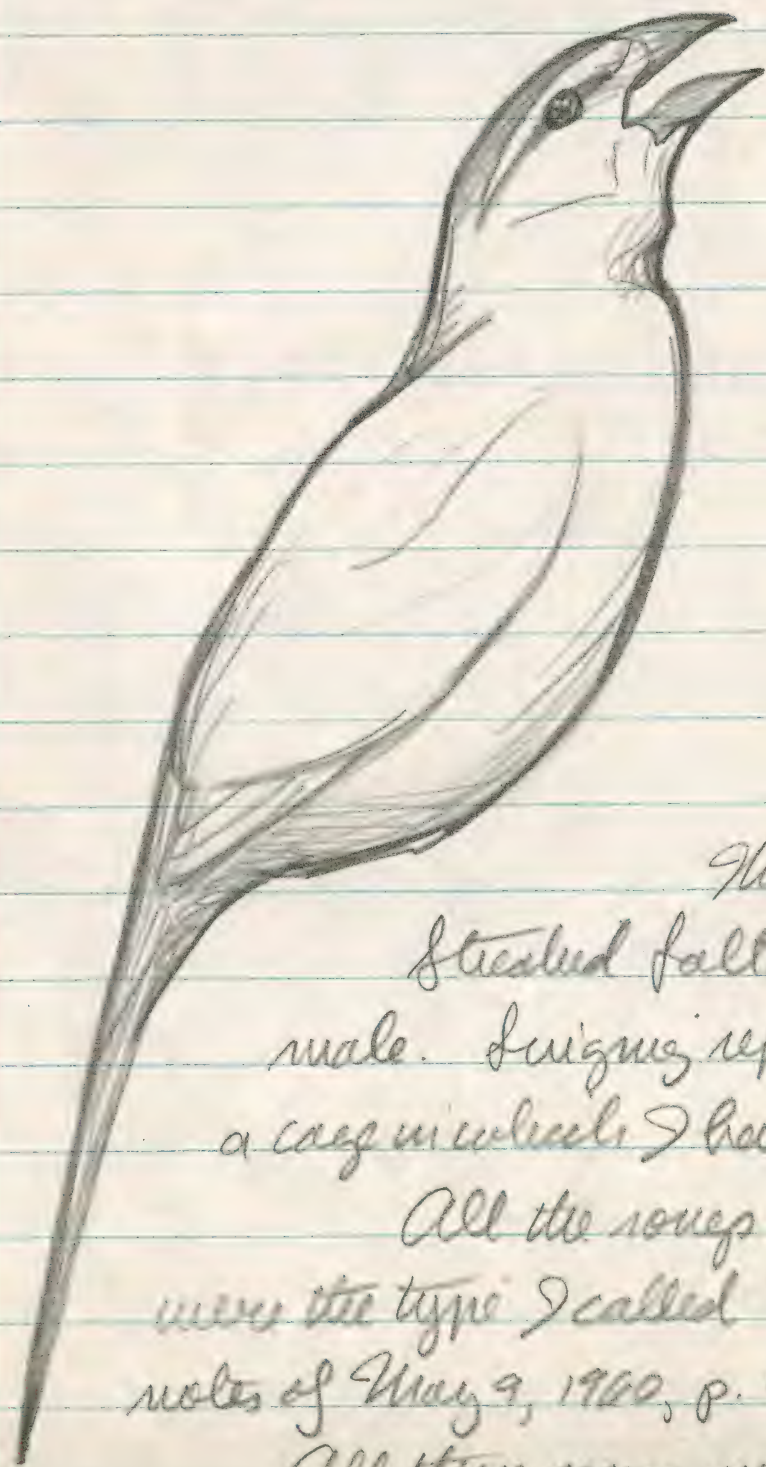
(45)

above on April 7, 1958, p. 8, and the calls transcribed on June 30, 1959, pp. 24 & 25, were really just typical Wbl's of the species.

I am really quite stunned at the extremely close resemblance between the vocal patterns of the saltators and those of the Sangre de Toro. By comparing the patterns of Tangara, Thraupis, Saltator, the Green-backed Sparrow, and the Sangre de Toro, it may be possible to determine the "basic" elements of the vocal repertoire of the whole group.

Saltator, I

March 29, 1961
Barro Colorado



Singing Posture

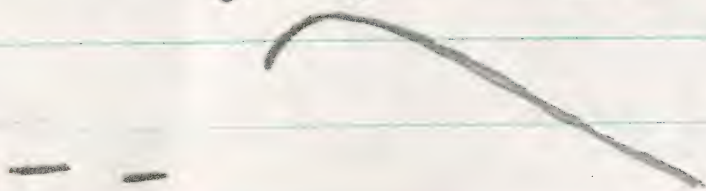
Notice flat head!

This morning there was a single streaked saltator in the clearing. Presumably male. Singing repeatedly for at least an hour. Near a cage in which I have captive flycatchers.

All the songs uttered by the free bird today were the type I called "incomplete" before — see my notes of May 9, 1960, p. 43.

All these songs were essentially uniform. I think there

can be represented by the following diagrams



and



(I am now fairly certain that the long notes, the whistles, are descending in pitch.)

(I have also come to the conclusion that such song patterns are rather similar to certain songs of *Atlapetes* spp.)

I wonder if these "incomplete" songs are partly or wholly homologous with the WBL's of other species of Saltators ????

The streaked whistler sang this morning usually sang from a posture like the one drawn on the preceding page. Crown feathers smooth. Head tilted upward. Neck not very elongated. The drawing on the preceding page is a much better drawing than the one shown in my notes of April 10, 1958, p. 11.

The only variability in this singing posture involved the position of the wings and tail. I think that the wings and tail were sometimes held as in the drawing on p. 11.

The bird always sat still while singing. Between song phrases it hopped from bush to bush and tree to tree. It uttered loud, hoarse, harsh notes when it moved. Usually in series of 3 or 4 notes. There were probably G.H.A.C. Possibly H.A.C. One of the captive birds in the cage frequently uttered similar notes while the free bird sang.

Saltator, I

March 30, 1961
Frijoles

Back at Frijoles just at dawn (6:10 a.m.).

A streaked Saltator flew to a high exposed perch soon after I arrived, and began "Kew" song. Probably the same bird I observed uttering "Kew" song on March 28, 1961. Singing in same place.

The posture in which the bird was uttering "Kew" song today was comme ça:

I think that the white eyebrows were raised, like the yellow eye brows of the Yellow-faced Guanquit.



I am sure that all of this drawing is quite correct, except, possibly, the crown shape.

Wings not drooped very much.

The "Kew" songs uttered by this bird this morning were slightly different from the ones I heard on March 28. Usually alternation of clear notes and lower-pitched rattling notes. (These rattling notes might possibly be transcribed by something like "Krooo".) Sometimes a single note which was much higher than most of the other clear notes was interjected in the song, usually in the position in which

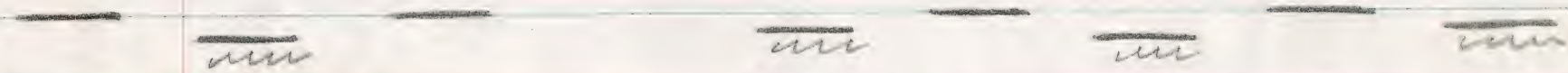
Saltator, Mar. 30, 1961, II.

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As an ordinary clear note would be expected. At first, I thought that these unusually high notes were a distinctly different type of note, but later on I noted that the bird occasionally uttered intermediates between typical clear notes and the highest kind of high clear notes. A typical bit of "Kew" singing by the bird this morning might be represented by the following diagram:



Every once in a while, the bird would utter 2 clear notes, usually or always one of relatively low pitch and then one of relatively high pitch, in the middle of the song. Comme ça:



The bird continued "Kew" singing for almost an hour, with only 2 or 3 brief interruptions. These interruptions occurred when it changed perches. (It did not utter song in flight). Alternated between 2 trees. (The same trees in which it gave "Kew" song on March 28). Always perched high in an exposed position when it gave "Kew" song.

None of the "Kew" singing provoked any response from any other Streaked.

When I first arrived, while it was still rather obscure, before the Streaked began "Kew" singing, I heard a few typical Streaked "Incomplete" songs coming from rather low in the shrubbery of the area which later appeared to be within the territory of the Streaked which gave the "Kew" songs.

Later in the morning, around 7:25, some time after the Streaked

Saltator, Mar. 30, 1961, III.

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called had stopped "Kew" singing, I heard more "Incomplete" songs coming from the same area.

All this might suggest that "Kew" singing and "Incomplete" singing are produced by the same type of motivation, and that the "Kew" is higher intensity than the "Incomplete".

All the "Incomplete" songs of the Stralied this morning were the usual type. — — — — —

I saw a Buff-throat, by itself, utter quite a number of "Incomplete" songs, of the usual type for the species, in a perfectly relaxed sitting posture. Not elongate at all.

It is definitely my impression that the Buff-throats do not usually utter their "Incomplete" songs from high exposed perches. Usually a little below the top of moderate sized trees and tall bushes, rather concealed by leaves. (Note: "incomplete song" = W6E)

Saltator, I.

April 4, 1961

Barro Colorado

I have had 2 Buff-throats in a cage with lots of other tanagers and finches for a long time. Always very dull. Then this morning I noticed that they were disputing with one another. A very long-sustained dispute. One bird chasing the other from perch to perch, almost without interruption, for at least 15-20 minutes. The beginning of the breeding season?

Both birds seemed to have CR throughout the whole performance. One or both birds uttered a lot of "songs" throughout this dispute.

Saltator, Apr. 4, 1961, II.

(50)

to these "songs" were quite variable.

Some of the "songs" appeared to be typical Wbl's. Such typical Wbl's were only uttered when there was a momentary lull in the dispute. Apparently ~~lower~~ intensity than the other "songs" uttered during the dispute.

When the dispute was most vigorous, two slightly different types of "song" were uttered. One was a pure Rattle, followed immediately by a typical Wbl. (the Wbl appearing to be a sort of "terminal flourish" to the R). More or less comme ça:

~~~~~ r ~~~~

The other type of "song" was similar except that the terminal Wbl had a definite rattling quality or undertone (sometimes almost as strong as the pure R).

(This combination of Wbl + R may be reminiscent of the Yellow-rumped tanager.)

I know that the more aggressive of the 2 birds uttered all 3 types of "song". I am not sure if the less aggressive bird uttered any.

After a while, the less aggressive bird appeared to become tired, and occasionally let the more aggressive bird land close beside it without flying away. The more aggressive bird would then go into a rather unvirtualized "Forward" Posture and peck at the less aggressive bird. This "Forward" Posture was very much like the FG-Hff drawn on May 6, 1960, p. 38, except that the breast & belly feathers were less fluffed and (probably) there was slight trace of CR. Always silent. The less aggressive bird always flew away immediately after being pecked.

Both birds sometimes did a little regular unvirtualized-looking preening and cleaning, usually silently, when they were perched not too far from one another.



Saltator, Apr. 4, 1961, III,

(51)

I heard single "Isceet" notes from time to time during the dispute this morning. Usually or always, I think, when the birds were flying. But I couldn't determine who uttered them, or why.

There were no real FG-Off or Lt G-Off or Submissive Ruffle + G patterns during the dispute this morning.

It was obvious that the more aggressive bird during the dispute this morning was relatively less aggressive than the Yellow bird during the dispute observed on May 6, 1960 (vide the CR).

Saltator, I.

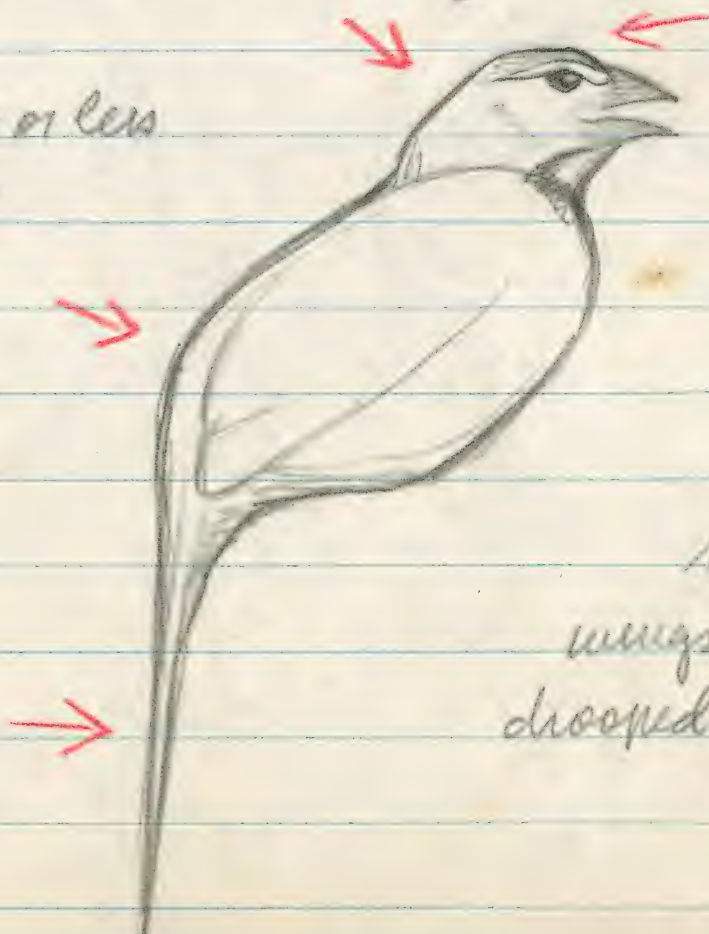
May 30, 1961  
Frijoles

I saw a few interesting reactions by saltators near the RR station this morning.

One Buff-throat, sitting by itself, on a high exposed perch, singing a slightly distinctive "dawn song" around 6:17.

In posture more or less  
comme ça. Neck not  
stretched up.

Possibly a low  
intensity posture?



I am not quite  
sure of the position of the  
wings. Almost certainly  
drooped to some extent



Saltator, May 30, 1961, II.

(52)

The song uttered by this bird might be transcribed by something like "Whee-ew whee-ew-ew whee-ew whee-ew-ew" (In the "whee-ew-ew" notes, the terminal "ew-ew" was always very greatly accented.)

This did not appear to provoke any response from any other bird and the singing bird eventually just flew away.

Much later in the morning, I saw a vigorous dispute between two Buff-throats (one of these birds may have been the bird I heard singing earlier). Lots of supplanting attacks. Very rapid. One bird retreating steadily before the attacks of the other. Both birds quite silent, except for a few Wbl's (probably uttered by both birds). Once the retreating bird assumed a very conspicuous ritualized posture. More or less comme ça

Accompanied by WF's,  
and 1 or 2 Wbl's.



Extreme St.

Breast & belly very  
ruffled.

CR ?

Wings drooped ?

Tail fanned ?

The retreating bird was supplanted again a few seconds after adopting this posture. I.E. the posture was certainly not effective as threat.

Early this morning, when I first arrived at the RR Station, there was a Streaked singing in the same area where I heard the Streaked singing "Kew" and "Kew Kroo" songs on March 28 and March 30. (see above). But today it only sang the type of songs which I used to call "incomplete", i.e. the type of song shown in the diagrams



Saltator, May 30, 1961, III.

(53)

on p. 46. This is presumably an indication of declining intensity.

Saltator, I

June 3, 1961,  
Los Angeles

Have been watching Green-backs around here for several days (see current notes on Ammodramus). During all this time, there has been a family of streaked Saltators in the neighborhood. 3 birds. Presumably 2 adults, 1 young. Very noisy. One (or more) birds utter(s) a lot of "incomplete" songs. All the birds seem to utter lots of harsh "GHAC"s, both in flight and when landing next to one another.

This morning, around 8:00 a.m., I saw one of these streaked Saltators land near the other two. It uttered "GHAC"s as it landed. One of the other birds immediately flew straight to the newcomer, uttering "GHAC"s as it did so. Landed directly on the back of the newcomer. Perched there for a second or so, fluttering its wings. Both birds silent. Apparently a copulation attempt!! Then the bottom bird, presumably the ♀, flew away and the other bird followed. One or both birds uttered more "GHAC"s as they flew away.

If this was a cop. attempt (as I think it must have been), it was obviously unsuccessful.

I think the "GHAC" notes uttered by these birds might be transcribed as "chā-āh chā-āh chā-āh...". Quite remarkably harsh — much more so than the GHAC's of Green-backs.

All the "incomplete" songs I have heard uttered by this bird (or birds) have been remarkably stereotyped. Might be transcribed as "Duh-duh duh wheeeooooo burrrrrrrr". Uttered both at dawn and later in the morning.



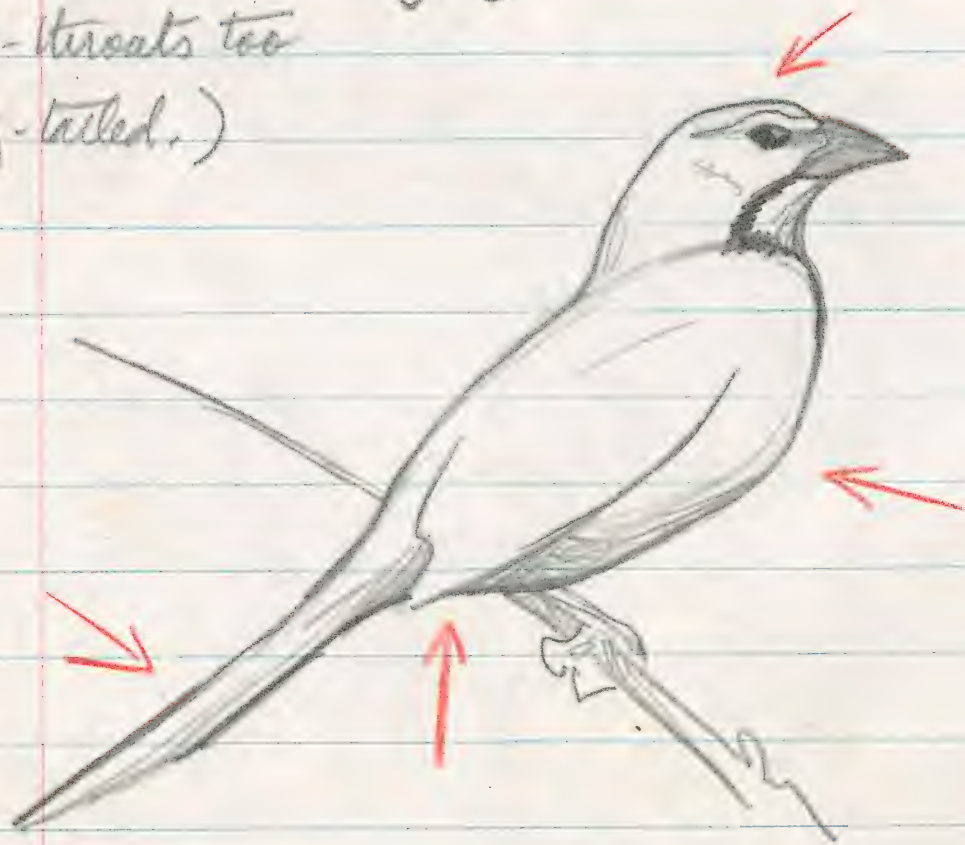
Saltator, I.June 5, 1961  
Barro Colorado

Yesterday I caught a wild Buff-throat. Banded orange. Put in a cage with some other finches: 2 other Buff-throats, 2 Striped Saltators, 1 ♂ Rose-breasted Grosbeak.

This morning, just before leaving for Balboa, I noticed that the new Buff-throat was singing a "dawn song". More or less comme ça: "Tee-hooo tuh-tuh-hooo tee-hoo tuh-tuh-hooo, ..." Quite regular alternation of bisyllabic and trisyllabic notes. Only exception the very occasional insertion of an extra "tee-hooo" note.

In posture comme ça:

(Notice how large-headed and short-tailed the bird looks. I think that I may have been drawing my Buff-throats too long-tailed.)



Small eye-stripe

While the bird sang in this way, it was sitting alone. Quite ignoring the other birds in its cage.



Saltator, Jun. 5, 1961, II,

(55)

The bird did not sing continuously. Occasional irregular pauses. But the song was obviously indeterminate.

Several times, in the pauses between songs, the bird did silent CR, in an ordinary sitting posture, when another Buff-throat came close to it.

June 17, 1961  
Frijoles

Saltator, I

Early this morning, I saw a single Buff-throat (probably the same bird observed singing on May 30, uttering "dawn song"s. Began at 6:05 a.m. (not earlier). Songs "Tee-hoo tee-hoo-hoo tee-hoo tee-hoo-hoo . . . ."

It is now obvious that the alternation of bisyllabic and trisyllabic notes is characteristic of this species.

This morning the bird sang from three different high perches, all in the same area (about 20 ft apart from one another). Stood in ordinary standing posture while singing. Looking quite slim (not at all like the drawing on p. 51).

The "dawn songs" were not continuous for long periods of time. Frequently interrupted by silent BW's (sometimes 3 or 4 in a series). Displacement?

It struck me, this morning, that one of the most characteristic features of the "dawn song"s of this and other species — all the indeterminate songs, in fact — is that the constituent notes are usually very evenly and regularly spaced



Saltator, I.June 10, 1961  
Barro Colorado

Looking at my cage full of saltators here 6:00 a.m.

The 2 old Buff-throats are banded blue and red. Red seems to be ♂. He was uttering "dawn song" this morning when I first began to watch the birds. Unusual form.

Several disputes between 2 birds (can't identify the birds). With silent G's. Once a bird did G + CR. Another time a bird did G definitely without CR.

One bird did a lot of "dawn singing" around 6:15 a.m. I couldn't tell if the bird was red or orange. All I could see was part of the lower half of a bird. It was sitting in an ordinary sitting posture, with wings drooped and spread a little. Every time it uttered a "dawn song" note the wings were slightly fluted, or, perhaps more probably, quivered very briefly and slightly. I don't know if this quivering or fluting was ritualized or not. It may have been nothing more than the mechanical after-effect of producing the notes (like the simultaneous tail movements).

I did not watch the birds for a few days after first introducing the orange Buff-throat, because they are all quite shy and I didn't want to get them too excited until the new bird became acclimatized. While casually walking in the area around the cage, however, I did notice quite a lot of chasing in the cage during the first 2 days after orange was introduced. Usually red chasing orange. Sometimes blue chasing orange. There were quite a lot of WBL phrases during the chasing during the first day. I did not notice R's or R-like sounds the first day. On the second day, however, there were lots of "Tuk tuk tuk tuk" and



Fallopia, Jun. 10, 1961, II.

(57)

similar calls uttered during the chases of the Buff-throats. These appeared to be R's, probably lower intensity than many or most of the R's uttered during the dispute described in my notes of May 30, 1961. Never included many syllables in a single series. (Most of the R's heard during these chases were very reminiscent of the R's of Summer Tanagers in sound. Some of the R's of the Buff-throats during these chases might possibly be transcribed as "Tit tit tit tit" rather than "Tuk tuk tuk ..."). The number of notes per R was somewhat variable. I think the R's with fewer syllables tend to be slower than R's with more syllables. The Buff-throats also uttered a few WBL's during the chases of the second day, in addition to their R's. By this morning, chasing had greatly diminished in frequency and vigor. I heard only one WBL during a chase this morning. A few more R's, but not many. All the R's this morning were Summer-tanager-like.

There are 2 Starlings in this cage with the Buff-throats. They have not shown the slightest tendency to get involved in any of the Buff-throat reactions.

The Buff-throats have occasionally uttered their high single "Treet" notes while flying around the cage during the last few days. These must be PCN's or FCN's. I rather incline to think they are the latter, although they sound like the PCN's of many other species. These "Treet"s are probably identical with the "Wheet"s described above on May 6, 1960, p. 40; Apr. 17, 1958, p. 12; and Apr. 28, 1958, p. 12. I have also heard quite a lot of similar notes, recently, uttered by flying single wild birds near Frigoles.

This morning, every once in a while, when one of the captive birds (usually red) landed near me, it uttered 1 or 2 (usually 1) sharp



but not very loud "Tut" or "Tsit" Notes. Before flying away again immediately. There may have been ALCN's. They also sounded very much like single syllables of an R.

I have heard quite a lot of GHAC's by Streaked Saltators recently. Both my captive birds and the wild ones at Frijoles. At Frijoles, they are occasionally uttered by single birds in flight (wide shuttle), but only, I think, when the birds are flying to join a companion and can see the companion already. I can confirm my earlier statement (December 30, 1958, p. 23) that the GHAC patterns of the Streaked are intermediate, in form, between the more "typical" GHAC's of some other species and the "chuck" notes of Palm & Blue Savanahs. They seldom or never have the "accelerated diminuendo" effect of the GHAC's of Green-backed Sparrows.

Yesterday, at dawn, I observed a Streaked, sitting by itself in a low bush, utter a rather peculiar version of "incomplete song".  
 Coucou ga!

mmmm

"Whit-clu chunh chaaaaaah chuh" More reminiscent of the Green-backed Sparrow than the usual "incomplete songs" of Streaked Saltators. Often repeated.



Saltator, I.June 14, 1961  
Frijoles

Early this morning, I saw a single streaked saltator singing typical "incomplete" songs, with CR.

Saltator, IJune 18, 1961  
Frijoles

Yesterday we took two newly hatched nestlings away from a pair of streaked saltators. The ♂ of the pair is probably the bird which sang the peculiar song described above on June 10, 1961, p. 58, and sat in the peculiar posture sketched immediately above. I have also heard it utter a lot of perfectly conventional "incomplete" songs during the last couple of weeks while I have been watching the Green backed Sparrows. I.E. this bird has sung a lot while its mate incubated.

This ♂ may also have been the bird which attempted the unsuccessful copulation described above on June 3, 1961, p. 53.



Saltator, Jun. 18, 1961, II.

(60)

This morning I was very interested to see what this pair would do, after leaving its young. Unfortunately, I could only watch the saltators occasionally, because the Green-backed Sparrows were so active.

I noticed that one or both of the saltators uttered quite a lot of GHAC-type notes when it (or they) were moving about very actively. Some of these GHAC's were relatively very sharp. Almost like the Click Notes of the Green-backs. Probably more strongly hostile than less sharp GHAC's. (It is possible that the streaked saltators were alarmed by my presence today. Their sharp GHAC-type notes may have contained a strong escape component. If so, they may be strictly homologous with the Click Notes of the Green-backs. I may eventually decide to call them "Click Notes" too.)

I shall call this pair of streaked saltators "X" from now on. The X ♂ sang a lot this morning, around 6:10 a.m. A continuous series of "incomplete" songs

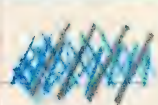


etc etc etc.

No trace of "typical" dawn song.

Saltator, I

July 26, 1961  
Guila

 = Tricolored race of Gray Saltator = S. c. brewsteri

Birds of this species are supposed to be quite common around here. In second growth, typical saltator-like country.



Saltator, July 26, 1961, II

(61)

Yesterday morning, down at the old abandoned American air-base, we saw a solitary Gray Saltator singing. Around 9:30 a.m. This song consisted of repeated phrases. All the phrases were essentially identical:

Whit                      Whit  
Whit              Whit  
Hauh                      Hauh

The bird sat in an ordinary unritualized posture (neck not stretched upward) while it uttered these phrases.

According to David Snow, most of the songs of this species are usually composed of doublets.

Saltator, I

July 27, 1961  
Lunla

Watching a pair of Gray Saltators in another area of the savanna country early this morning.

The 2 birds were perched near the top of a medium-sized tree. On exposed lead branches. About 6 ft. apart from one another. One of the birds (presumably the ♂) sang the same phrase over and over again. One of these phrases might be represented as follows

xxxxx



Saltator, July 27, 1961, II.

(62)

"Duh duh wheeeoooo wheeeooo auh"

Sometimes a few extra, nondescript notes were tacked on to the end of such phrases. The terminal "auh"s were loud, nasal, and "trumpeting" (rather Zebra Finch-like). These terminal notes may have been closely related to the "hauh" notes of the song described above on the preceding page; but they were very much more emphatic and conspicuous.

The bird sat in a quite unritualized posture while it uttered these song phrases. Erect. Rather fluffed. Neck not skeletoned.

It is possible that the song patterns of this race are really quite different from those of the Squitos race.

Saltator, I

February 15, 1962  
Frijoles

I have been watching birds along the RR tracks here in the early mornings, both yesterday and today, between 6:00 and 8:00 a.m. Saltators are still numerous here, but not very active - yet.

I have not heard any "incomplete" songs by streaked Saltators here (although one bird on the island uttered several "incomplete" songs this morning).

I watched a solitary Buff-throat yesterday morning uttering occasional brief Wbl's as it moved thru the brush. All these Wbl's were essentially similar "Duh duh duh wheeeeee - zah"

Quite obviously largely or completely homologous with some "incomplete" songs of streaked, but accelerated.



Saltator Feb. 15, 1962, II

(63)

This morning, I watched 2 Buff-throats in a tree. Not close together. One of the birds uttered a brief Wbl. The other flew away, and landed in another tree. The first bird followed, and landed in the same other tree. Again not close. The first bird uttered a thin, high, R as it landed. The other bird flew away. The first remained where it was. Uttered many short Wbl's.

This incident was presumably hostile. But it resembles some of the behavior between mates described by Skutch. Was Skutch mistaken?

This afternoon, I heard Wbl's coming from my cage of captive Buff-throats. Presumably accompanying chasing. These Wbl's were longer than the ones I have heard uttered by the *Tijoles* birds recently.

Does this species have 2 distinct types of "Wbl's"? I doubt it.

Saltator, I

February 17, 1962  
Rio Piedras

Came across a single Black-cap this morning, ca. 8:15 a.m. about 30 ft up in Cecropia tree. Uttering one type of phrase, repeated by, at fairly rapid intervals. A single phrase might be transcribed comme ça: "Ta weeeeeee tuh tuh".

The long second note usually or always quite metallic or bell-like. Definitely always (also) whistle-like. Last 2 notes somewhat hoarse. Rather CHN-like. The whole phrase quite reminiscent of what I called



Saltator, Feb. 17, 1962, II

(4)

Intro before, but the first note was definitely not CHN. Very reminiscent of a slowed-down version of the ordinary Wbl uttered by single Buff-throats and the "incomplete song" of single streaked Saltators. The bird uttered these phrases while sitting or standing in a variety of apparently unritualized sitting and/or pre-flight postures. No CR (or Hgff).

Sometimes it uttered abbreviated versions of these phrases, always.

A few minutes later, ca. 8:50, I saw the bird again, moving thru the tree-tops. Uttering lots of these, moderately loud, "Insect" Notes. Presumably what I called "TSN"s before. Presumably homologous with the "PN"s of other species.

Saltator, I

February 21, 1962  
Rio Piedras

Arrive area where Black-cap was on Feb. 17. Arrive 6:20. Still quite dark.

A single Black-cap flies into tree 6:25. Uttering single "Aow" Notes as it flies in and after landing. These "Aow"s are both plaintive and harsh. Bird feeds briefly. Continues uttering single "Aow"s. Also occasional single CHN's, and occasional single notes which seem to be intermediate between typical CHN's and typical TSN's (I shall call the latter CH-TS notes).

The bird then flies away. Back immediately. Uttering CHN's as



as it comes. Then two CHN's close together — just as it lands. These latter were quite reminiscent of the "GHAC" or "HAC" type notes of other species.

It is possible that the Hoarse Note and Short Harsh Note patterns of this species, and the Streaked (at least), are not well separated. More closely linked than in such species as the Sangre or the GBS.

Then the bird stops in tree for quite a while. Sometimes perched, sometimes feeding. Utters a few thin TSN's. Then it utters a whole series of CHN's, interrupted by occasional CH-TS Notes, while feeding.

6:40 a.m. I can now hear series of TSN's in distance. But can't see bird uttering them. (I think there are probably 2 Black-caps in the immediate vicinity here, but I can never see more than one at a time - if that!). This series of TSN's indeterminate, but not long. Much more irregular in rhythm than most Dawn Calling of other species. Some of the TSN's are quite hoarse. Intermediate between typical TSN's and typical CH-TS Notes.

6:42. One bird begins "Intros" More or less comme ça:

"Tseeee-tseeee tsa-wa chuk-chuk"

— —

— —

— —

The last 2 notes of each phrase seem to be typical CHN's. Each phrase very rapid. Repeated at fairly frequent intervals. Some of the phrases include an extra pair of "Tseeee" type notes. More or less comme ça:



Saltator, Feb. 21, 1962, II.

(60)

ca:

"Tseee-tseee tsa-wa tseee-tseee chuh-chuh"



--

\*\*\*

Unfortunately I can't see the bird uttering the Intros.

Leaving to try to get a better view 6:45

Back again 7:00. Bird feeding in trees. Not uttering Intros. Uttering a fair number of single TSN's, a few CHN's. More or less jumbled. Then utters 1 Intro phrase in middle of TSN's and CHN's. All these notes, including the Intro, uttered from completely unritualized postures. Not accompanied by special movements.

A few minutes later, a single bird in the same tree, begins to utter series of "abbreviated" Intros. "Tsa-weeeeee"s. Comme

ca:



These notes are uttered as the bird feeds. No ritualized postures or mo



Saltator, Feb. 21, 1962, III,

(67)

III elements.

(The bird which uttered these abbreviated Intros has very little black on chest, ♀?).

7:15 a.m. Hear a Black-cap in a tree some distance away. Possibly not the bird(s) I have been hearing & watching most of the morning. This bird uttering TSN's and CHN's in rather regular rhythm. Usually alternately. An occasional extra CHN interspersed from time to time. This is very reminiscent some W Note and CH Note patterns of GBS's.

Saltator, I

February 22, 1962  
Rio Piedras

Working in another area this morning.

At one time this morning (ca 7:00 a.m.) a single Black-cap came upon me unexpectedly. Perched low in bush, watching me. Uttered lots of very harsh "Aow" Notes. With some WF's and lots of TF's. TF's U-D. Usually, but not always, with very extreme lateral component. Then flew away.

Sometime later, I heard a single Black cap (probably the same bird) uttering more single "Aow"s. Less harsh than the earlier notes. Uttered in rather regular rhythm, at fairly long intervals. The bird seemed to be quite near me, but I couldn't see it. Eventually flew away. Uttered one CHN, then more "Aow"s, as it flew.

This was certainly not the bird that I heard uttering "Aow"s yesterday.

I don't really understand the function of the typically not very harsh, "Aow" patterns. A means of calling in mate? Possibly.



Saltator, Feb. 22, 1962, II.

(68)

stuckly homologous with APCN's of Sayre de Toro ♂'s ???

Late this morning, ca. 7:50 a.m., I came upon a single Buff-throat uttering Wbl's. Repeating "Tsawee tsawee". Then another Buff-throat landed in a bush about 10 ft. below the first bird. The first flew down toward the newcomer. Landed about a foot away from it. Uttered brief soft R as it flew down. Then began to sing more Wbl's. Repeating "Tsawee tsawee". Then one bird flew away. This was certainly hostility. Between mates ???

Saltator, I

February 23, 1962  
Rio Piedras

I came upon a ♀ Stealied Saltator by surprise at 17:30 a.m. today. She immediately flew to a tree approx. 20 ft. away. Uttered 2 or 3 "HAC" and/or Short Hostile Notes as she flew. Landed on a high exposed perch. Immediately went into a Pre-copulatory Posture. Lifted head and bill in ft. Spread wings horizontally. With little or (much more probably) no Q!!! Breast lowered, underparts fluffed or ruffled. She probably raised her tail at the same time, but I couldn't actually see it. She stood in this posture 1 or 2 seconds. Then a ♂ flew straight on to her back. Copulated. Quite possibly successful. Post cop. very brief. Quite silent. Then the ♂ flew straight off the ♀'s back. Landed on perch about 5 ft. away. No post cop. display by either bird. Both sat for approx. 10 sec. Then ♀ flies off. ♂ follows her. One bird utters a few "HAC" or Short Hostile Notes in flight.



Saltator, I

(69)  
February 24, 1962  
Rio Piedras

Arrive area where streaked saltators were 6:00 a.m. Everything still silent

See first streaked 6:50. Obviously member of pair watched yesterday. Lands in tree. Utters 2 or 3 "chuck" notes, of the "SHN" rather than the "MAC" type, as it lands. Apparently by itself. Then sits silently for a couple of minutes. Eject. Then utters 3 incomplete "Incomplete" songs. Then flies away silently.

7:05 a.m. See two Buff-throats perched high in dead tree. One bird uttering lots of Wbl's. Long sustained, just divided into quite definite phrases. Each phrase more or less commences

"Tit tit ta tit tsawoo tsawoo" Often with more short "Tit"-like notes at end. All very warbling in effect. The other bird just sits. Silent. Then the two birds start to fly from perch to perch within the same tree and in adjacent trees. The one bird which was Wbl-ing when I first saw the birds (the ♂?) usually utters more Wbls as before at each perch. The other bird (the ♀?) remains silent. Usually just sitting. Both birds do a little preening from time to time, the presumed ♂ more often than the presumed ♀. The presumed ♂ may be particularly apt to preen when approaching or being approached by the presumed ♀. The presumed ♀ spends considerable time sitting looking away from the presumed ♂. The two birds do not seem to be moving steadily in any particular direction. The presumed ♀ probably follows the presumed ♂ more frequently than the reverse. But there are obviously exceptions to this general rule.

When I first saw this behavior, I thought it was connected



with pair formation. A ♀ sticking to a ♂ who was still relatively strongly hostile to her. But now I am not so sure. The presumed ♂ may have been engaged in a territorial dispute with a third bird whom I did not notice. In any case, a third bird suddenly appears in the same tree as the first two. The presumed ♂ of the pair chases away the intruder. Utters Wbl's before and after the attack flights. The presumed ♀ followed the presumed ♂ during the chase. Then the 2 birds of the pair land together. The presumed ♂ utters more Wbl's. With lower breast and belly feathers fluffed or ruffled (presumably Gflf).

After this, I lost track of the birds. But Smith observed and recorded a long dispute, probably involving the same 3 birds described above. One of the aggressive birds uttered lots of Wbl's. Also some Rattles. According to Smith's recording, the Rattles tended to occur before the Wbl's. Smith also saw one bird (not the vocal bird) do St like the pattern drawn on p. 39. With Fur, (but Smith did not notice any general fluffing or ruffling of lower body plumage).

7:34 a.m. A single streaked flycatcher Presumably young to join its mate. Utters "Chaa chaa chaaa cha..." notes. These may be considered "chuck" notes of the "HAC" type.

7:50 a.m. Come across pair of Buff-throats (again). Almost certainly the pair observed earlier. Both sitting. One alternating periods of Wbl-ing and silent preening. Then they start to move thru shrubbery. One uttered a series of accelerated "Tut" notes, developing into real but brief R, when landing beside the other. Then one supplants the other. Wbl before supplant. Then both fly off. Utter "Tut" notes in flight. Series of a few single "Tut"s. — —



Saltator, Feb. 24, 1962, III

(74)

Then utter an accelerated series of "Tut"s, forming an R, when one bird lands beside the other.  
8:00 a.m. Hear more R's when one bird lands beside the other.

Does this suggest R's are lower intensity than Wbl's ???  
My observations today would suggest that the R of the Buff-throat has replaced the HAC of the streaked in much the same way that the R of the Yellow-rump has replaced the HAC of the Sapsucker.

Saltator, I

February 23, 1962  
Rio Piedras

Arrive same area as yesterday 6:05 a.m.

7:00 a.m. Hear some "incomplete" songs of a streaked Alouatta certainly ♂ of pair that copulated day before yesterday.  
"Duh duh whee" and "Duh duh whee wheeeeee"

7:35 a.m. 1 Buff-throat. Uttering Wbl's. Supplanted by another. Twice. Each time supplanter utters R before and during supplant. Then supplanter flees in pursuit of supplanted. Supplanter utters R → Wbl during chase.

This was presumably a territorial dispute.

Territorial disputes seem to be remarkably common in this species.

Come across a pair of Buff-throats 8:05. Probably same pair.



Saltator, Feb. 25, 1962, II.

(72)

that I thought was engaged in pairing yesterday. Utter series of "Tut"s in flight. Then perch about 5 ft apart. ♂ utters Wbl's at rather regular and long intervals. ♀ sits facing me at foot. Doing silent ft. Moderately extreme. Superimposed upon ordinary sitting posture. Wings slightly drooped & spread. Then ♀ stops ft, turns around and faces ♂. Then both fly off. Utter series of "Tut" Notes in flight.

These hostile displays (Wbl's & ft) may have been provoked by and directed toward me.

I swarmed a single streaked cat in the morning. This bird I may have uttered a single "Tset" Note flying away from me.

Saltator, I

March 3, 1962  
Rio Piedras

Come across two streaked Saltators 6:37. Same area where copulation seen week before last. The two birds perched and flying from perch to perch about 20 ft apart. Uttering lots of Hoarse Notes. Sometimes HNC-type, sometimes SHN-type. Most often the latter, I think. Lots of intermediates and intergrades. One bird also utters brief R's. More or less comme ça "Krooo" uttered at least 2 of these notes (single, both times) while perched. Then the 2 birds fly together. I can't see what they are doing, but I hear at least one more "Krooo" and lots more Hoarse Notes. Then both fly away.

I couldn't tell if this was a "pairing" reaction or a territorial boundary dispute.

The brief R's seemed to be identical with the mm notes sometimes uttered by ♂'s during "alternate note song"!!!



Saltator, Mar 3, 1962, II

(73)

One streaked back almost immediately. Alone. Feeding. Flying from limb to limb and perch to perch. Utters one or more (usually at least 2 or 3) Hoarse Notes (CHN type) each time hops or flies to a new perch. Both when moving and landing. Not before taking off. Once, when it utters a series of Hoarse Notes, it is "answered" from a considerable distance, by another streaked who utters another series of Hoarse Notes, but this is the only apparent response provoked.

This streaked moving from perch to perch also utters occasional single "Trit" Notes. Sometimes alone. Sometimes just before a series of Hoarse Notes. Presumably some sort of "ALCN" or "FCN".

Two birds of a presumed pair of Buff-throats. Settling perched about 5-17 ft. apart. One preens. The other utters WBL's. No overt indication of hostility of any sort between the birds. Then both fly away.

Back to same area in afternoon.

Heard a single streaked 5:45 p.m. Flew to another perch, uttering Hoarse Notes in flight. Then lands where I can't see it. Utters 2 "Trit" Notes. Then begins to utter "Incomplete" songs. All eventually "Duh duh-duh wheoooooh".

All the "Incomplete" songs I have heard here on other days were of the same type. Characteristic of this individual (or local population)? Or typical of fairly late in breeding season ?? (I must compare these phrases with the corresponding phrases of the streaked saltators at Trisoles.)



Saltator, Mar. 3, 1962, III

(74)

A single streaked land about 20 ft from me 6:35 p.m.  
Utters relatively high pitched Hoarse Notes (CHN type) as it lands.  
Then sits. Utters several single "Trit"s. These "Trit"s are not  
accompanied by special ritualized postures or movements. Defin-  
itely no CR. Then bird flies away again uttering more Hoarse Notes  
in flight.

Saltator, I

March 8, 1962  
Barro Colorado

2 of my captive Buff-throats, Red and Orange, have died  
within the last few days. Orange actually died last night. This  
leaves me with only a single bird in the cage. The old Blue. (It seems  
to have lost its band.)

Watching it now, 1:10 p.m. Flying about cage. Uttering occasional  
single "Treet" notes.

A wild Buff-throat comes in to visit. Utters brief R as it  
lands in nearby bush. Looks. Blue continues uttering "Treet"s, but  
I can't see it now; 1:14 p.m.

Visitor is just hovering & pivoting nervously. Irregularly.  
No CR or Off. Silent. Does several rapid BW's.

Then visitor flies away.

Blue continues uttering "Treet"s. Each note quite short.  
But series as a whole quite regular. — — — — —

Indeterminate. Quite reminiscent DCing of BC  
BT's !!! Then stops.

Then starts to fly around cage. Uttering occasional single "Treet"  
note.



Then winter back. Again utters brief R as it lands on perch.  
1:25. Blue doesn't react overtly. Continues flying around as before.  
Then winter disappears again. Blue shuts up.

Then Blue starts to utter rather long plaintive, single "Treet"s  
When perched before flying down to feed. Then when feeding quite irregular.  
Then shuts up again 1:35.

Caught the winter 1:40!!! Banded yellow. Put in cage  
with Blue. Goes straight into shrubbery. Can't see it.

Then I hear R, R-Wbl, and Wbl! Also occasional  
"Treet"s in background. Then only "Treet"s. Then another Wbl.  
Then pursuit flight with "muffled" R. Followed by more  
Wbl's. All these Wbl's short. Composed of short notes.

Brief fight silent. Can't see who is attacking whom.  
Then Blue stands in St & Aff. Apparently uttering Wbl's  
in this posture (?!?).

More Wbl's by bird I can't see. All preceded by brief R.  
1:46 p.m.

Brief interruption while I get boots.  
Come back to find Yellow in "F" posture. No Aff. No CR.  
Silent. Gaping (Panting). Lots of TF's & WF's. Some pursuing.  
"F" posture is obviously only pre-flight.

Then some chasing with "muffled" R's. I think Blue must  
be the aggressor, but I can't actually tell.

Both birds silent 1:55. Except for occasional single "Treet"  
By Blue?

Blue supplants Yellow. Blue utters brief R coming in. Other  
was no display.

A little irregular chasing still going on 1:58. But this is



Saltator, Mar. 8, 1962, III.

(7)

certainly far from a high intensity fight. Both birds silent now. Can't see Blue. Yellow only. Hushing.

Now Yellow just trying to get out of cage.

Leaving myself 2:00 p.m. before Yellow becomes too exhausted.

I forgot to add that Yellow uttered a series of H's (and/or "Harsh Harsh Notes") ~~when~~ ~~when~~ ~~when~~ ~~when~~ ~~when~~ when handled in the net.

The notes I have transcribed as "Tseet" above are certainly identical with the notes I transcribed as "Wheet" on previous occasions. I am still a little puzzled about them. They certainly sound as if they should be PN's, but this would be difficult to prove.

I watched Blue very briefly early this morning. When she presumably became aware that Orange had disappeared she uttered a few single "Tseet" or "Wheet" Notes when flying about the cage. Then a burst of similar notes just before going down to feed and during feeding. Also a burst of similar notes, while she perched on a branch, after I had gone into the cage (to remove Orange's body) and then left.

I don't think I have ever heard bursts of "Tseet"s (like the bursts I have heard several times today) before. Blue may be (or have been) uttering more "Tseet"s today because she is trying to attract a mate.

Neither Orange nor Blue uttered very many "Tseet"s or "Wheet"s yesterday afternoon when I went into the cage - in spite of the fact that they flew around frantically. This would suggest that such notes are not ALN's, and probably not FCN's. The fact that such notes are not uttered very frequently when birds



Saltator, Mar. 8, 1962, IV

77

As are chasing one another would also suggest that they are not FCN's.

A Striped Saltator has uttered a lot of "incomplete" songs near my house during the last 2 days. (This may be a capt we bird I let loose a couple of months ago.) All these vocal patterns have been identical with the "incomplete" song diagrammed above on p. 74

Saltator, I

March 9, 1962

Buenos Aires

Watching the Blue and Yellow Buff throats briefly this morning, just after dawn. Well. Blue is flying about the cage in a more or less normal manner, most of the time. Sometimes with, sometimes without, "Tset" notes. Yellow shuffling or sitting quietly.

At least once, Blue assumes a not very intense S & G off for a few seconds. Silent.

Blue repeatedly supplants Yellow, without display by either bird.

Now, 6:45 a.m., Blue is almost completely silent. Uttering very few "Tset"s.

Leaving myself

Saltator, I

March 14, 1962

Rio Piedras

In Black-cap area at dawn. First bird shows up, alone, at 5 a.m. Quite silent, except occasionally for a few notes.



Saltator, Mar. 14, 1962, I

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set "Notes" (presumably TSN's).

A few minutes later, I hear a couple of CHN's, then occasional single TSN's — that is all. Then, 6:20, combinations of WHL- and HAC-type Notes (can't see bird).

7:00 a.m. Come across what seems to be a boundary dispute between Black-caps. 3 birds in tree. 1 repeatedly follows, often supplants, another. The third just tags along, some distance after the other two. The supplanter spends most of time in an St. Posture. Like the one drawn at Porto Bello, with breast lowered ("BL"). But bill sometimes almost vertical. Little or no fluffing or ruffling of any kind. Sometimes silent in this posture. At other times quite vocal. When vocal, utters calls consisting of one whistle-like "Isaweeet" Note, followed by a variable number of Heave Notes. Sometimes eventually CHN's. More often HAC-like. These calls would seem to be abbreviated versions of some of the more complex calls I heard during disputes at Porto Bello. Once the supplanter uttered a burst of HAC notes just as it landed after being supplanted. A sort of "landing HAC". In a completely unritualized sitting posture.

Eventually one bird flies off, and all 3 disappear.

The St's during this incident were obviously ritualized. And obviously more than flight int. moves. Usually assumed facing the bird toward which they were directed. Emphasizing white throat with its black borders.

Come across a single Black cap 8:00 a.m. Uttering lots of CHN's interrupted by single TSN's. Often irregularly. Sometimes regular alternation 2 CHN's and 1 TSN. Bird eventually flies away.

9:30. Come across 3 or 4 more Black-caps. Moving thru tree tops in irregular stages. One bird utters lots of "Isaweeet" Notes.



Saltator, Mar. 14, 1962, III

(79)

No! Perhaps there are "~~several~~  
Notes

ter. The same as I heard uttered by the other bird earlier this morning. (I think I called these sounds "Wtl" when I heard them uttered by the birds at Porto Bello.) One or more of the other birds in this group here also utter(s) "Isawweet"s, but less frequently. One of the birds here (probably the bird which utters "Isawweet"s most frequently) also utters more complex vocalizations from time to time. A single "Isawweet" followed immediately by a series of short hard rapid HAC-type Notes (less metallic than CHN's)

-----  
This in turn sometimes followed by another "Isawweet"

-----  
I think all these calls were uttered from more or less unritualized sitting postures, but I can't be more about this.

Birds move on, ca 9:40, without my being able to follow them.

Saltator, I

March 15, 1962  
Rio Piedras

17:00 am. 1 Buff. titmouse in tree, about 20 ft away from another. Utters Wbl after Wbl. Each phrase short. But all separated by whole intervals. No other overt signs of hostility. But it is significant that the Wbl's of this species are uttered relatively very rarely by



Saltator, Mar. 15, 1962, II.

(8)

completely solitary birds. The overwhelming majority of them are uttered by birds near other birds. Quite different from WS's of BT and PT!!

Saltator, I

March 17, 1962  
Rio Piedras

6:40 a.m. Apparently single Black-cap flying from perch to perch. Utters "Isaweeet tra-ta" phrases each perch. "Isa-tra" Notes slightly hoarse. It is possible that such phrases are intermediate between typical Wbl phrases and "Isaweeet" - HAC patterns.

6:45. One Black-cap <sup>♀?</sup> Perched moderately high and very exposed. Uttering alternate CHN's and TSN's. Occasional extra CHN's. Another, presumably its mate, perched about 5 ft. away, uttering very occasional TSN's at long and irregular intervals. Then latter flies away. First bird continues "Alternate Note Song" as before. Very long-uninterrupted. Still continuing 6:53. Bird uttering excited W CR or other special postures or movements. Occasionally preens between notes.

This species seems to utter Alternate Note Song comparatively frequently.

Then another bird <sup>♂?</sup> appears near bird uttering Alternate Note Song. Mate again. Apparently uttering "Isaweeet" - HAC each time it lands, going from perch to perch, altho I can't actually see it. "Greeting - Landing" Call?? First bird continues Alternate Note Song for a few seconds. Then both fly off. Probably in same direction.

7:40. One of same Black-caps back. Utters Alternate Note



Saltator, Mar. 17, 1962, II.

(87)

long as before. Fly away almost immediately.

7:50. Same 2 birds back. One perched fairly low. Uttering "Isaweeeee" - HAC patterns. Each phrase might be transcribed as "Isa - weeeeee kha kha kha kha ...". Number of terminal HAC Notes quite variable. Sometimes only 3 or 4. Sometimes at least 3 times as many. Both hoarse and sharp, but less sharp (and loud) than usual CHN's. Bird sitting in ordinary posture. Quite excited. No CR. Neck not particularly elongate.

The other bird sitting, hidden, a few feet away. Every time the first bird utters the terminal HAC Notes of the "Isaweeeee" - HAC phrase, the second bird also utters a burst of similar HAC Notes! Usually fewer than the first bird.

During many of the phrases of the first bird, the initial "Isa" of the "Isaweeeee" was hoarse and harsh - hardly distinguishable from the terminal HAC Notes. These "Isaweeeee" patterns were very reminiscent of the phrases I called "Intros" when I watched the Black-caps at Peto Bello!!

After a minute or so of this behavior, the two birds moved off. Flying from bush to bush. Each time they landed, the first bird uttered a "Isaweeeee" - HAC phrase as before, while the second usually uttered a few HAC Notes at the same time the first uttered the terminal HAC's. Obviously "greeting" like CHAC of the streaked saltators.

When they stop. First bird perches and utters phrases as before. Then I see second bird is picking up n.m.!!

So this is definitely a pair!!

Then both birds fly off and disappear.

I shall call this pair "B".



Saltator, Mar. 17, 1962, III

(8)

Come across a single Saltator 8:25. Singing "Incomplete" songs (I shall call these "Incos" from now on). All essentially similar in form: "Duh duh-duh-whuh wheeeooooo".

No trace of any terminal R or note with R undertone (such notes are obviously not usual parts of the Inco.) These Incos being uttered from usual posture. Usually (always?) with crown feathers ruffled (but not raised together to form "real" crest). Also throat feathers ruffled. Quite conspicuous.

Then bird flies about. Utters HAC Notes in flight and also when landing by itself. Then back to Incos as before 8:35.

Saltator, I

March 18, 1962  
Rio Piedras

Arrive area of B Black-caps 6:00 a.m.

Then first Black-cap calls 6:45 a.m. Repeated phrases: "Wheet-wheet" - some HAC Notes. Bird far away. Also utters occasional "Wheet-wheet" alone. Also occasional "Tseeeeeeet wheet-wheet".

Come across another Black-cap 7:00 a.m. It starts Alternate Note song as soon as it sees me. CHN's and TSN's with occasional extra CHN. This seems to be a "pot. med." reaction. Other birds have tended to do it when I appeared.



Saltator, Mar. 18, 1962, II.

(83)

There is another bird near this Black-cap. Utters occasional "Isa-weet" - HAC N's as first continues Alternate Note Song ("ANS")

Perhaps this is B pair after all.

Then first bird starts to utter "Isa-weet tra-tra" phrases. Second bird starts to synchronize its "Isa-weet" - HAC phrases with phrases of first bird.

"Isa-weet" notes tend to intergrade with CHN-TSN doublet. TSN starts to come immediately after CHN. CHN becomes less hoarse or rasping. TSN becomes somewhat longer.

Birds fly off 7:05. Then I move to another area. Hear Bird which is definitely one of the B's, 7:07. Uttering "Isa-weet" - HAC pattern.

"Isa-weet" - HAC is definitely the equivalent of the GHAC of the streaked saltator (at least in the case of the ♂ - I haven't definitely heard both sexes of Black-caps utter such phrases. They are probably both capable of it - I have heard both sexes utter "Isa-weet"s and HAC notes separately - but they may not give both notes, together, at the same time.)

Everything is very dull here today - both among the Black-caps and the Yellow-rumps. Why? Correlated with weather? It is still and partly overcast today. Birds were much more active yesterday, when it was windy and it looked like heavy rain at one moment.

8:10 a.m. Again a bird starts Alternate Note Song when I approach. One of B's. Then starts to utter "Isa-weet" - HAC phrases (Perhaps mate has joined it in tree at this point.) Then switches to "Isa-weet tra-tra" phrases, then back to "Isa-weet" HAC phrases. At this point, I finally manage to get bird in my glasses. Sitting erect, wings slightly drooped. No CR. Then its mate lands on same



Saltator, Mar. 18, 1962, III

(84)

branch, about 6 ft away. Mutual "greeting." Both birds utter "Isa-weeeet tra-tsa" - series of HAC Notes. Bill OCB for "tsa-weeto" and "tsa-tsa"s, closed throughout HAC Notes. Then both birds utter a lot more such phrases, at moderately long (but fairly regular) intervals. One bird starts, and is joined a second later by its mate. I notice both birds have a tendency to "lean" forward, head and neck pointing diagonally upward & forward, with each burst of HAC Notes. Quite a conspicuous contrast with upright posture during preceding notes. Heads bill more or less in line in diagonal posture.

During some of the later phrases, one of the birds, almost certainly the ♀ (smaller than its mate) utters a soft, whistled, "ta-ta-whooooo-oooo" toward the end of the phrases. Much softer, more pleasant, and more plaintive than any other call of the species I have heard. This occurred at the same time or instead of the terminal HAC Notes of the phrases. I thought it was uttered at the same time as HAC by the same bird!  
Comme ça:

{ Isa-weeeeeeet tra-tsa ta-ta-whooooo-oooo-  
cha cha cha cha cha }



But perhaps the HAC Notes accompanying these terminal plaintive whistles were uttered by the other bird.

I think I have heard similar terminal whistled phrases uttered in association with "Isa-weeeet" - HAC phrases before. Also by one or both



Saltator, Mar. 18, 1962, IV

(83)

h of the B birds.

Why does this species have such an elaborate vocal repertoire? Obviously very aggressive. And perhaps the birds of different pairs of this species are more strongly attracted to one another than are streaked Saltators.

Saltator, I

March 23, 1962  
Rio Piedras

7:15 a.m. Apparent pair of Buff-throats moving thru shrubbery by stages. One or both utter R's in flight. One also utters Wbl's frequently while perched between flights. Once a brief R right after a Wbl. Both the Wbl and R of this species seem to take the place of the "greeting" and "landing" HAC complex of streaked Saltators.

Saltator, I

March 24, 1962  
Rio Piedras

Move area of B pair Black-caps 6:00 a.m.

Fruit bird heard 6:35. Apparently alone. Utters CHN's in flight. Then lands (where I can't see it). Utters several series of notes. "Tsa-weeeet tsa-tsa tuh-tuh-tuh" and "fweeeet tsa-tsa tuh-tuh-tuh" (In both cases, the terminal "Tuh-tuh-tuh" is HAC.) Mingled with quite a lot of single "Tsa-weeeet" and/or "fweeeet" notes. Then flies on.

In case I have not mentioned it before, all the "Tsa-weeeet" and "fweeeet" type notes are loud whistles.

This incident would seem to suggest that the "Tsa-weeeet"



Saltator, Mar. 24, 1962, II

(86)

and "seeeeeeet" Notes are less hostile than HAC (or CHN).

6:45. Can hear Black-cap uttering Alternate Note Song in distance. I don't think this bird can be reacting to me.

7:15. Now a bird does start Alternate Note Song when it sees me.

8:17. Another bird (of different pair) also starts Alternate Note Song when it sees me.

Saltator, I

March 25, 1962  
Rio Piedras

Notice solitary Black-cap 6:50. Uttering Alternate Note Song when it sees me. Then switches to uttering "Isa-weeeet" Notes when I move away a little and it seems to become habituated to me. In quite regular rhythm. One or two after the "Isa-weeeet"s followed by single HAC Note. Then flies off to feed. Continues uttering "Isa-weeeet" Notes from time to time. I think it is answered by bird in distance. Utters occasional "Isa-weeeet"s and "Isa-weeeet"-HAC patterns.

This incident suggests "Isa-weeeet" may be real PN, used to call in mate. If so, it is easy to see how this species could have evolved "Isa-weeeet"-HAC "greetings" from the "G-HAC" of other species.

A few minutes later, one of the same birds flies in to branch right over my head. Utters Alternate Note Song. Its mate utters both single "Isa-weeeet"s and "Isa-weeeet"-HAC patterns while the first bird continues Alternate Note Song.

Then first bird flies to rejoin mate. One of the birds utters "Isa-weeeet"-HAC as it lands.



Saltator, Mar. 25, 1962, II

(87)

I think I shall call "Tsa-ueeeet" Notes "PN", from now on.

Saltator, I

March 24, 1962  
Rio Piedras

Pair of Black-caps moving through 7:20 a.m. "Greeting" each time they land together. One bird utters PN-series of HAC Notes or PN-series of HAC Notes - PN, while the other bird joins it in the HAC. Quite as before. They also utter their patterns sometimes when both are just sitting a few feet apart or one is sitting while the other feeds nearby. Quite like other saltators.

7:55 a.m. 2 Black-caps (different pair from above?) sitting in tree. Uttering "greeting" PN-HAC-PN patterns. Aui (Smooth-billed?) sitting in same tree, a few feet away. The two Black-caps continue their vocalizations for quite a while. Gradually change. One or both birds tend to utter musical phrase, more or less "dul whee-hoooo" after HAC instead of terminal PN.

This musical phrase whistled, perhaps an extreme development out of PN "complex". More

or less similar to whistled phrases I have heard after PN-HAC in other circumstances. Then one of the birds begins to supplant the Aui. At least 3 times. Perches between supplants. Utters PN-HAC-PN each time it perches. Its mate twice does silent G when it joins





Saltator, Mar. 26, 1962, II

(88)

by during the supplants. One eventually leaves supplanter then  
hits a few feet away from mate. Both birds repeatedly utter PN-  
HAC-PN, more or less synchronized. Both have breast and belly fea-  
thers rather fluffed, both during and between vocalizations.  
Both sitting erect. One, at least, (I can't see the other one well)  
also seems to have slight CR (see drawing on preceding page).

These musical phrases after PN-HAC are the only patterns  
of the species which are reminiscent of the WS's of Streptopelia. Could  
have been derived from something like the latter.

Saltator

April 22, 1962  
Cerro Punta

Working at fruit site this morning, at level of the tower  
6:40 a.m. Hear (without seeing) a Streptopelia uttering  
"Incomplete" songs. All musically similar.  
"Duh duh wheeeessah duh duh"



Last 2 notes sometimes repeated. Rattle undertone to long notes.  
These songs now like those of the Chirical than are the songs of the  
Streptopelia Saltator of central Panama.



Saltator, I

May 10, 1962  
Barro Colorado

Both my old captive Buff-throats are doing well. Yellow lost its band, and has now been re-banded Red.

This morning it poured rain. Shortly after dawn I heard DC coming from the Buff-throat Aviary. Went down, to find that the DC was being uttered by Blue. Almost all this DC was composed of soft, flute-like notes, quite like the DC Notes uttered by other Buff-throats I have watched. Except that all these notes were essentially 5-syllabled. "Chee-a-a-a-wee-oo."

The bird was sitting in posture comme ça:

Quite fluffed. Slight CR. (Both types of feather erection may have been reactions to rain.)



Bill OCB with notes, but only very slightly

This DC was very long-sustained. Occasionally interrupted by a single "Cheewink" Note. Barely syllabated. Louder and harsher than ordinary DC Notes. With a faint rattle undertone (at least toward the end of each note).

These Cheewink Notes may be homologous with the R's of the Alternate Note Song of the streaked Saltator. They were also more



Saltator, May 10, 1962, I.

(70)

||| y reminiscent of the R's of Piranga spp. !!!

Saltator, I

May 12, 1962  
Barro Colorado

Putting the yellow & purple banded bird ("Yellow") in cage with Blue and Red 7:30 a.m.

All birds freeze when Yellow first put in. Can't see them. Then Yellow hops around in extreme St, extreme Tnn, and extreme fluffing underparts. Making rapid slight bowing movements. Little or no CR. No Hiss. One of the other birds utters Wll (soft and rapid). Then one of the other birds flies to perch near Yellow. Both hop about rapidly. Both extreme St. No CR. Underparts fluffed. Wings drooped & spread to some extent. Tnn. Irregular rapid bowing movements. Both apparently silent. Then other bird retreats. Yellow relaxes 7:35.

All this Bowing quite slight. Head not lowered below shoulders. Bill probably pointed downward to some extent in all or most cases. The whole thing looks unritualized in form.

The birds kept their bodies horizontal or only slightly diagonal during their St's & Bowing. Not in line with head & bill during St's.

Yellow hopping about now, 7:40. More St's. Extreme fluffing underparts. Definitely no CR. Wings very drooped & spread, but not held out from body. Silent.

7:41. Sudden aerial fight & chase involving all 3 birds. Lots & lots of Wll's. All very prolonged and rapid, and all very



Saltator, May 12, 1962, II

(91)

much softer than usual. These Wbl's are probably also less "rattling" than usual (i.e. the notes are not very different in pitch) but they are certainly far from being rattles. Several times, one of the birds (probably Blue) catches up with another (presumably Yellow) and a violent pecking bout develops. These pecking bouts accompanied by HAC notes. Always brief.

Chase & fighting continues irregularly for some minutes. At one time Blue and Yellow pause for a few seconds, facing one another, about 2 ft apart. Blue perched above Yellow. Blue Bowing. High Bow position is flt. Body more or less horizontal. Underparts very fluffed. No CR or Thflff. Wings drooped and up. Tail in very extreme Fan! Some indications of lateral TF's but these are slight and seem to be "impeded". Blue Wbl's steadily throughout this period. Wbl's soft, rapid, as before. Continuous for a considerable period of time. Bill kept slightly open throughout. Mandibles not moving to any appreciable extent.

While Blue does this, Yellow faces him, looking up at him (this may be flt, but difficult to tell). Bill wide open in extreme G. At the same time, Yellow utters series of very soft and "breathy" HAC notes. Each note separated by definite pause. I shall call such notes "MHAC". While doing the G-MHAC, Yellow has underparts fluffed and wings drooped. Does not Bow. No CR. The feathers of his throat are slightly ruffled, but not enough to prove that he is performing a ritualized Thflff pattern.

Yellow seems exhausted and defensive while performing these G-MHAC patterns. They may be high intensity, produced when escape is stronger than attack.



Saltator, May 12, 1962, IV.

(92)

It seems obvious that Yellow is a ♂. At least, Blue thinks so!

Then the chasing and fighting resumes 7:45. We remove Yellow and put him back in his old cage by himself. Also remove Red and put it in a cage by itself. I hope Red is ♀.

When we chased Yellow-front, at 7:30, before putting him in cage with Red and Blue, he uttered a few "Tset" notes flying back and forth in his cage. Red and Blue could hear him when he uttered these notes. They immediately began to fly back and forth in their own cage, in an excited, and alarmed-looking manner. This would suggest that the "Tset"s are Al CN's. (If so, this may suggest that Saltator is related to Emberiza.)

Yellow uttered H-Ser's each time when actually caught this morning.

This afternoon, I heard Blue begin to utter DC Notes ca. 1:30 p.m. Continued for several minutes. Began shortly after rain stopped. Why? Something to do with light intensity? Or the result of having sat immobile during the rain???

These DC Notes were more or less as usual. Ordinary tone and loudness. All or most composed of 4-syllables. Uttered in essentially indeterminate series. Most of the time, the successive notes were essentially identical. But - every once in a while a brief series of notes would be composed of slightly different notes in regular alternation: "cheeawee cheeawee-yoo"





Saltator, May 12, 1962, IV.

(93)

Such pairs of notes were slightly reminiscent of the doublets in the KV song of Piranga and Phenacus, in some respects, but I don't think that the pauses before and after each pair of notes were any longer than the pauses between the notes of a single pair.

I am beginning to think that this Saltator may be quite primitive!!!

Saltator, I

June 5, 1962  
Barro Colorado

Blue has continued uttering DC from time to time. This morning I will put Red back with it.

Red put in 6:10. Absolutely exhausted after being chased for five minutes. Just sits in corner, panting. Blue just hops about excitedly.

6:15 Blue flies to Red, lands beside it. Goes into St G Off. Utters lots and lots of "Tset" notes. Then flies away again. Then back again. Utters more "Tset"s in St G Off. Most "Tset"s single. A few double — — Red ignores him. Then Blue starts to chase Red. Chase silent. Then both perch again.

6:20 a.m. Blue now flying about cage silently. Red hidden.

6:25 I walk up to cage, to flush Red. Both birds fly around cage. Usually silent. Occasional single "Tset" note by one or both. Then back as before. Blue still flying around. Red hidden. Both silent.

Still continuing 6:45 a.m. Only difference is that Blue now utters occasional single "Tset" in flight.



Saltator, Jun 5, 1962, II.

(94)

6:46 a.m. Sudden long aerial chase. Accompanied by many "Tset" Notes — — — — — Then birds separate again. Red freezes silently in corner. Blue flies about by himself. Largely silent. Utters occasional single "Tset" Note (I shall call such notes "T" Notes from now on).

Blue does a lot of BW when perched between flights.

Still continuing as before 6:53 a.m. Blue quite silent now.

7:05 a.m. More chasing accompanied by "Tset" Notes. All or most of these "Tset"s are certainly uttered by Red, the escaping bird.

7:06 More chasing, just as before. Then separate again. Red freezes on wire side of cage. Blue flies about silently.

7:17. Blue lands beside Red. Goes into St G Jff. Apparently with T Notes. Then chases Red. Chase accompanied by both T Notes and R, all jumbled together. Former more common than latter. Then birds separate as before.

It is obvious now that T Notes are definitely purely hostile and produced when E is stronger than A. (Incidentally, Red uttered some T's when I was trying to catch it before putting it into cage with Blue). But T's are probably not Alarm Calls. Primarily used during intra-specific disputes.

Red remains rather sleek while frozen. No trace of submissive Ruffle. None of the St G Jff's this morning have been accompanied by either CR or Jff.

7:40 a.m. More chasing with T Notes.

7:42. More chasing. Quite silent. Then birds separate as usual.



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Leaving 8:05 a.m. as nothing more is developing.

10:00 a.m. Suddenly notice chasing going on in Red-Blue cage accompanied by rather thin, stifled HAC Notes "Keeyah keeyah keeyah keeyah keeyah keeyah...." Can't see if there are any special postures or movements. When I can see the birds, Red is frozen and silent and Blue is moving about normally.

10:05. Blue suddenly supplants Red. Accompanied by T Notes and 1 brief, stifled HAC Note.

Then birds separate again as usual.

NOTE: This afternoon I could still hear chases in the Red-Blue cage. Also Blue uttered DC occasionally. So it looks as if Red is ♂

June 6, 1962

Barro Colorado

Watching Red and Blue again. Dark rainy day.

5:50 a.m. One bird, presumably Blue, is uttering lots of DC. Unusual form. No "Cheerwink"s.

It is still too dark to see what is going on. DC stopped.

5:53 At least one bird flying about, uttering occasional T Notes. Then another brief burst DC. Then more flying about. Then more DC. Then complete silence. Then an aerial chase (both birds definitely involved) with series T Notes. Then birds separate. One goes back to DCing. Then silence again. Then more DCing. The DCing bird is Blue. Red is frozen on side of cage at the time.

5:59. DCing includes occasional Puanga-like "Cheerwink" Notes.

6:01. Blue flying about from perch to perch. Uttering burst



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of DC each place. Apparently ignores Red throughout DC performance. I.E. the DC of this species is definitely, not even partly hostile.

Then Red suddenly moves. Blue immediately chases it back and forth along cage. Chase with some T Notes. Then birds separate. Blue starts DC again. DC still with occasional "cheerwink"s.

Blue utters DC from almost every possible variety of sitting and/or pre-locomotor posture. Quite unritualized. No trace CR, Thflf, or special wing movements. DC never uttered in flight.

6:10 a.m. Now Blue shuts up and starts preening.

Blue now just flying silently around cage.

Leaving 6:20, as it is obvious nothing will develop here.

Oh oh. Another chase. Again obvious that it is Red who utters T Notes while escaping.

Yesterday morning we let the yellow and purple bird go free. This morning it visited the Red and Blue cage around 9:30 a.m. (if not earlier) and stayed a long time.

It frequently flew back and forth, and around and around, outside the cage, while Blue flew back and forth excitedly inside the cage. Both birds uttered a lot of Wbl's at such times. Blue (at least) also uttered occasional R's.

Every once in a while, the Yellow bird flew 20 or 30 ft away from the cage, sat, and uttered DC (without Wbl's). DC perfectly normal in form. No "cheerwink"s.

It is obvious that this Yellow bird was both looking for a mate and attempting to drive out a rival.

"Cheerwink"s may be an individual peculiarity of Blue



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⚡ About 2 weeks ago, I made some observations by the road near Miraflores lake (the Chiva Chiva trail). Saw a few Buff. thr. oaks.

6:00 a.m. Single bird DCing. Notes quite variable. Usually more or less "Koo-woo". Occasionally "Kee-vee". (Also some other variations.) Sometimes organized into doublets: "Koo-woo kee-vee koo-woo kee-vee koo-woo kee-vee....". Uttered from unritualized postures.

6:10 a.m. Pair fly by. Uttering lots of R's. Short and harsh. This may be the "GHAC" of the species.

6:23 a.m. Mon DC. Same bird as before "Koo-hoo kee-oo koo-hoo koo-hoo kee-oo...."